

2012 JCR Evaluation Form

Species: Mule Deer

Period: 6/1/2012 - 5/31/2013

Herd: MD740 - CHEYENNE RIVER

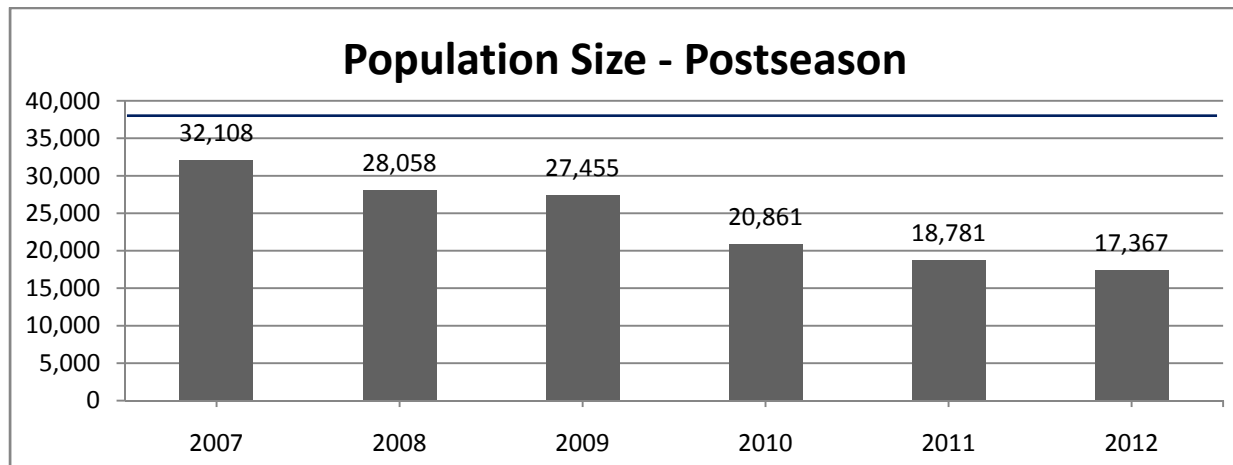
Hunt Areas: 7-14, 21

Prepared By: JOE SANDRINI

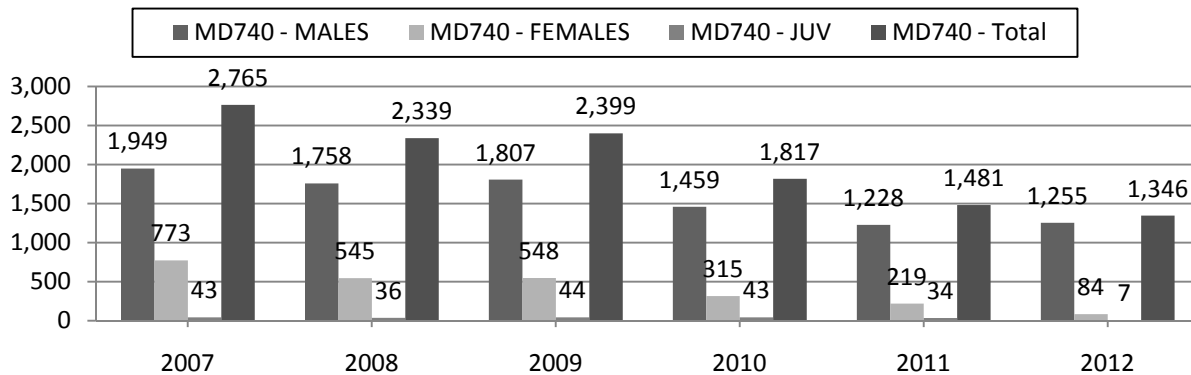
	<u>2007 - 2011 Average</u>	<u>2012</u>	<u>2013 Proposed</u>
Population:	25,453	17,367	17,678
Harvest:	2,160	1,346	1,193
Hunters:	3,319	2,511	2,210
Hunter Success:	64%	53%	54%
Active Licenses:	3,483	2,581	2,305
Active License Percent:	61%	52%	52%
Recreation Days:	13,824	10,479	9,805
Days Per Animal:	6.1	7.8	7.6
Ratio Males per 100 Females	37	33	
Ratio Juveniles per 100 Females	61	44	
Population Objective:			38,000
Management Strategy:			Recreational
Percent population is above (+) or below (-) objective:			-53.0%
Number of years population has been + or - objective in recent trend:			12
Model Date:			02/14/2013

Proposed harvest rates (percent of pre-season estimate for each sex/age group):

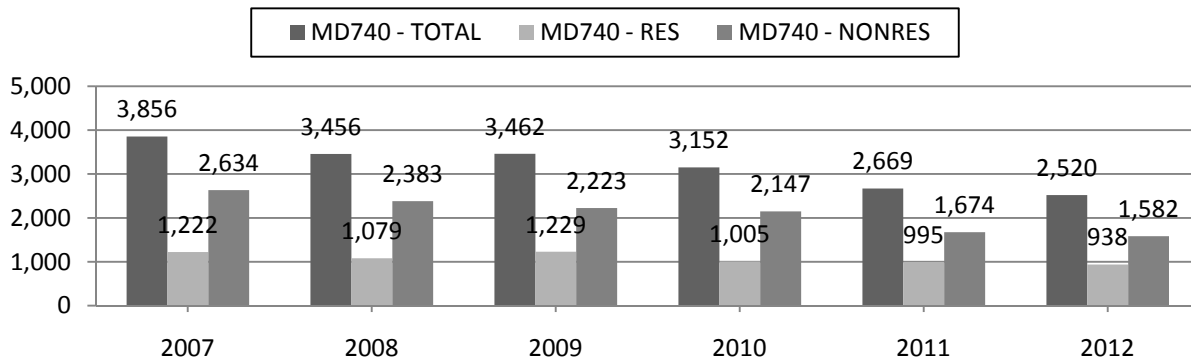
	<u>JCR Year</u>	<u>Proposed</u>
Females ≥ 1 year old:	0.9%	0.4%
Males ≥ 1 year old:	29.3%	30.3
Juveniles (< 1 year old):	0.2%	0.1%
Total:	7.9%	6.9%
Projected change in post-season population:	-7.5%	+1.8%



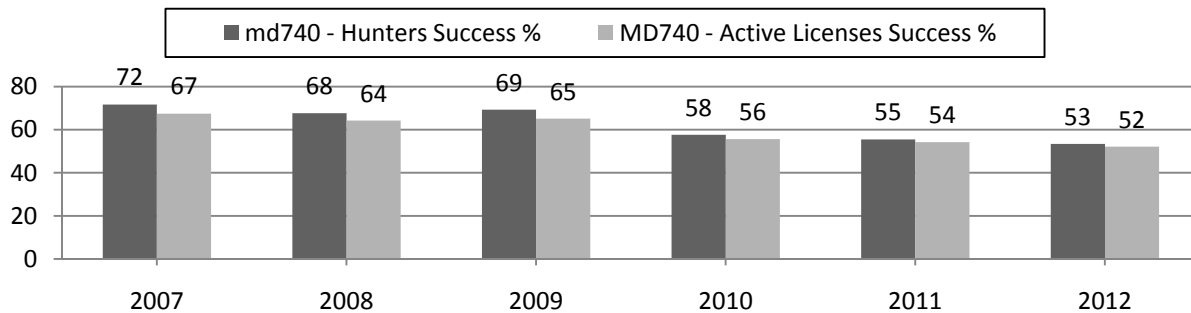
Harvest

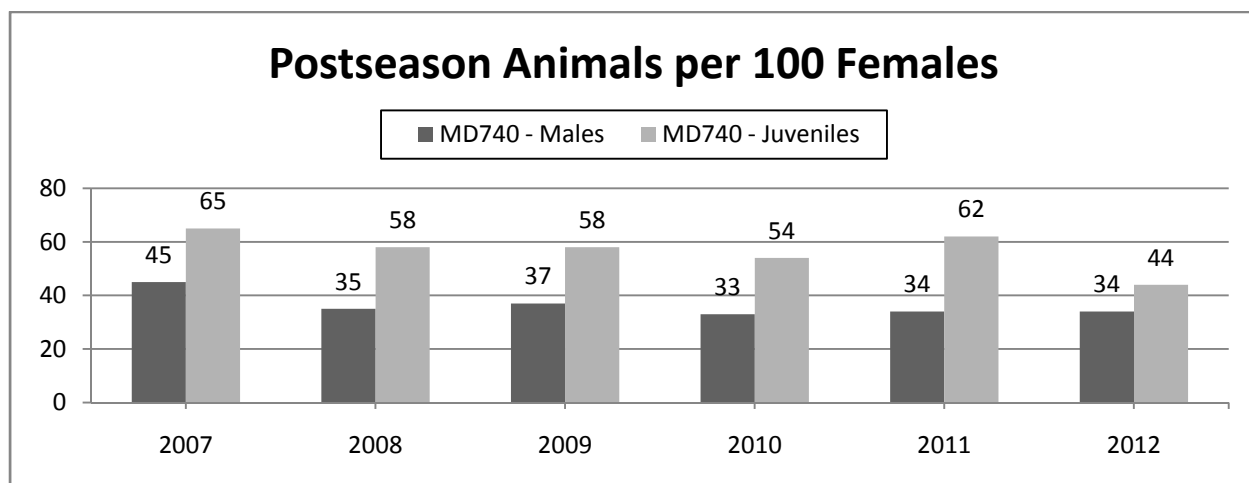
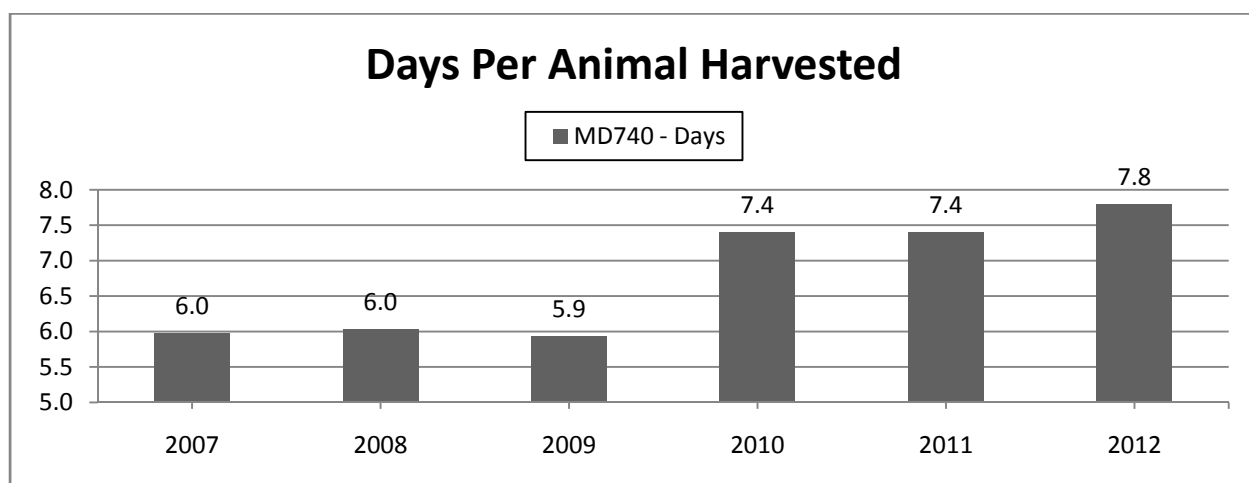
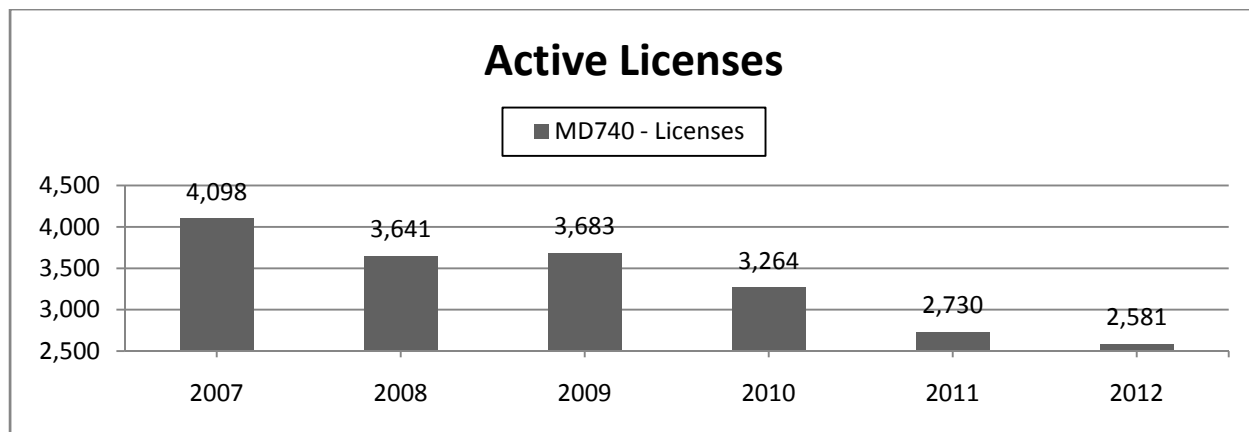


Number of Hunters



Harvest Success





2007 - 2012 Postseason Classification Summary *

for Mule Deer Herd MD740 - CHEYENNE RIVER

Year	Post Pop	MALES				FEMALES		JUVENILES		Tot Cls	Cls Obj	Males to 100 Females				Young to		
		Ylg	Adult	Total	%	Total	%	Total	%			Ylg	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2010	20,863	0	0	0	0%	0	0%	0	0%	0	1,145	0	0	0	± 0	0	± 0	0
2011	18,784	113	281	394	17%	1,155	51%	711	31%	2,260	970	10	24	34	± 2	62	± 4	46
2012	17,367	119	185	304	19%	932	57%	406	25%	1,642	1,201	13	20	33	± 3	44	± 3	33

* JCR database information only available since herd unit was created. Other charts in this report were created from raw data in stand alone excel file.

**2013 HUNTING SEASONS
CHEYENNE RIVER MULE DEER HERD (MD740)**

Hunt Area	Type	Season Dates		Quota	Limitations
		Opens	Closes		
7		Oct. 1	Oct. 15		General license; antlered mule deer or any white-tailed deer
8		Oct. 1	Oct. 15		General license; antlered mule deer or any white-tailed deer
9		Oct. 1	Oct. 15		General license; antlered mule deer or any white-tailed deer
10		Oct. 1	Oct. 7		General license; antlered mule deer three (3) points or more on either antler or any white-tailed deer
11		Oct. 1	Oct. 15		General license; antlered mule deer or any white-tailed deer
12		Oct. 1	Oct. 15		General license; antlered mule deer or any white-tailed deer
	6	Oct. 1	Nov. 30	50	Limited quota licenses; doe or fawn
13		Oct. 1	Oct. 15		General license; antlered mule deer or any white-tailed deer
14		Oct. 1	Oct. 15		General license; antlered mule deer or any white-tailed deer
15		Oct. 1	Oct. 15		General license; antlered mule deer or any white-tailed deer
21		Oct. 1	Oct. 15		General license; antlered mule deer or any white-tailed deer
Archery		Sept. 1	Sept. 30		Refer to license type and limitations in Section 3

Region B Nonresident Quota: 1,500

Hunt Area	License Type	Quota change from 2012
8	6	-25
11	6	-25
12	6	-25
13, 14	7	-25
21	6	-25
Herd Unit Total	6	-100
	7	-25
	Region B	-200

Management Evaluation

Current Management Objective: 38,000

Management Strategy: Recreational

2012 Postseason Population Estimate: ~ 17,400

2013 Proposed Postseason Population Estimate: ~ 17,700

HERD UNIT ISSUES: The Cheyenne River mule deer herd was created in 2009 by combining the Thunder Basin and Lance Creek herds. The postseason population objective is 38,000, a combination of the parent herds' objectives. The herd is managed for recreational hunting; and the management objective for this herd is scheduled to be reviewed during the 2013 bio-year.

There are about 6,350 mi² in this herd unit, and 5,485 mi² (86%) are considered occupied habitat. Approximately 75% of the land within the herd unit is privately owned, with the remaining lands administered by the United States Forest Service, Bureau of Land Management, or the State of Wyoming. As a result, hunter access is largely limited and controlled by landowners, and access fees along with outfitted hunting are common. Consequently, hunting pressure can be heavy on accessible public land. About two-thirds of the hunters pursuing mule deer in this herd unit are nonresidents. These nonresidents typically are more willing to pay trespass or access fees for hunting privileges on private land; or they hire an outfitter. Hunt Areas (HA) 8, 10, and 13 are the only areas containing large blocks of accessible public land, which most of the resident hunters seek. These hunt areas typically receive heavy hunting pressure throughout the season.

Primary land uses within the herd unit includes livestock grazing, oil and gas production, and some crop production. By far, the dominate land use throughout the herd unit is livestock grazing. The majority of oil and gas development occurs in the western and north central portions of the herd unit. However, substantial new oil and gas development is occurring in the central portions of the herd unit in northwest Niobrara County (HA 11) and significantly increased development is occurring near Douglas (HA 14). There are several large surface coal mines in HA 10 and HA 21, which create a high level of disturbance. In addition, coal bed methane development over a large portion of these same two hunt areas is expected continue to increase disturbance. Cultivation of alfalfa, hay, oats, and wheat occur mostly in the southern and eastern portions of the herd unit.

WEATHER: Drought in 2007, combined with poor habitat conditions and more normal winter weather, reduced recruitment. Since then, annual harvest of antlerless deer has dropped, but more severe late winter and early spring weather also beset the herd. The winter of 2010-11 was very harsh in the northern half of the herd unit, and the 2012 summer was the driest on record. The warm, dry conditions that beset the area during the end of bio-year 2011 continued through the 2012-13 winter. April of 2013 finally saw a break in the pattern of drought when temperatures dropped below normal for the entire month, and significant precipitation was again received (<http://www.ncdc.noaa.gov/temp-and-precip/>). Overall, the weather pattern during bio-year 2012 resulted in poor forage production, very low recruitment, and average over-winter survival of all age classes of mule deer. Tougher winter and spring conditions combined with dry summers have likely reduced fawn productivity and survival, and this is considered to be the proximate factor influencing this population's continued decline.

HABITAT: Sagebrush (*Artemisia ssp.*) steppe and sagebrush grasslands with scattered hills dominated by ponderosa pine (*Pinus ponderosa*) dominate most of the western, central, and northern segments of the herd unit. The eastern most lands in the herd unit are comprised of short grass prairie punctuated by the previously mentioned pine breaks, and there is a small area (45 mi²) of southern Black Hills habitat along the Stateline near Newcastle. Rolling ponderosa pine and limber pine (*Pinus flexilis*) hills and ridges dominate the southern portions of the herd unit. Major agricultural crops are grass and alfalfa hay, and winter wheat. Croplands are localized and found primarily southeast of Gillette, near Moorcroft, Upton, Newcastle, Manville, and Lusk. These variations in habitat types and limited riparian areas affect deer densities and distribution throughout the herd unit. The majority of mule deer are typically found utilizing broken topography characterized by conifer covered hills, or cottonwood and sagebrush dominated riparian communities. Scattered mule deer are found in the open sagebrush-grassland areas.

Several major cottonwood riparian drainages traverse the herd unit including the Belle Fourche River and Cheyenne Rivers including many of their tributary creeks such as Beaver Creek, Lightning Creek, Twenty-Mile Creek, Lance Creek, and Old Woman Creek. Overstory canopy along these drainages is dominated by decadent stands of plains cottonwood (*Populus deltoides*). The majority of drainages are ephemeral, and free flowing springs are rare. Water developments for livestock have benefited mule deer in this herd unit. Coal bed methane development has increased water availability near Wright and Gillette, but this water's quality and effects on the mule deer population are unknown.

The declining health and/or loss of shrub stands is a concern in this herd unit as evidenced from Wyoming big sagebrush leader growth and utilization measurements taken on established transects. In recent years, only utilization has been measured. In 2006 & 2007, drought coupled with grazing and browsing by wild and domestic animals, negatively impacted winter food availability. Conditions improved slightly between 2008 and 2010, but observed fawn:doe ratios were low, which was likely due to more normal to severe winter and spring weather patterns. Shrub condition and forb production declined substantially in 2012, when severe drought impeded growth and the fawn:doe ration plummeted.

The overall lack of cottonwood regeneration is also a concern in this herd unit. Photo-point transects have shown some dramatic losses of seedling and young cottonwood trees. These

losses have been primarily attributed to livestock grazing and beaver, and to a lesser extent by deer and elk. The health and vigor of riparian cottonwood communities and shrub stands needs to be enhanced if mule deer are going to thrive in this part of Wyoming.

FIELD DATA: While postseason fawn:doe ratios have undergone cyclical fluctuations, they have generally trended downward (Figure 1). Since 1991, fawn ratios have averaged 67 fawns per 100 does (std. dev. 12), which is below longer-term averages but above the mean of 55:100 observed over the past 5-years. Observed fawn:doe ratios dropped after the harsh winters of 1983-1984; 1992-1993; 2000-2001; and 2007-2008, but increased during the years following each nadir. Following the 2010-2011 winter, which was very severe in the northern one-third of the herd unit, fawn-doe ratios actually increased slightly above the preceding year. The apparent effects of this particular winter being perhaps moderated by a combination of better habitat conditions and fewer deer in the southern two-thirds of the herd unit, and more moderate spring weather with excellent forage production – parameters that did not present themselves following the other winters mentioned. However, extreme drought in 2012 manifested itself in the lowest fawn:doe ratio observed in this Herd Unit in recent history.

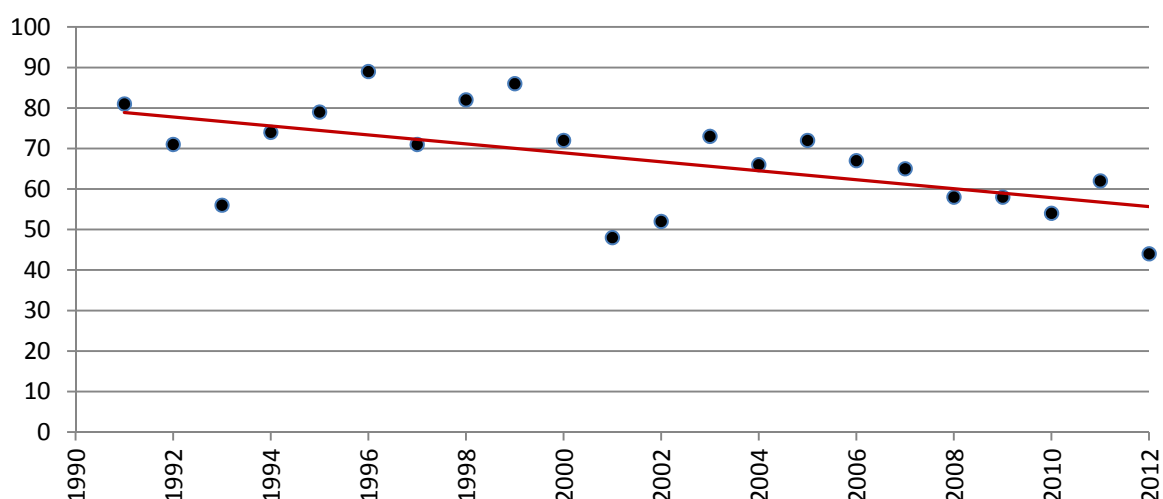


Figure 1. Post-Season Fawn:Doe Ratios: Cheyenne River Mule Deer Herd (1991 – 2012).

While productivity in this herd unit, as measured by fawn:doe ratios, has declined since the early 1980's, poor reproduction was not considered to be limiting in this herd until recently. Prior to 2009, lower productivity may have been a blessing, as difficult access to private land for hunters limited our ability to regulate deer numbers through sport hunting, and habitat conditions had become poor. At the time, area managers strongly believed the observed decrease in productivity was linked primarily to declines in overall quality and quantity of sagebrush and riparian habitat within the herd unit. However, beginning in 2009, weather conditions moved away from drought, and with reduced numbers of both domestic livestock and wild ungulates across the range, shrub conditions began to improve, but fawn:doe ratios remained suppressed. During this time frame more normal to severe winter weather was experienced and the

populations of small game animals dropped. This may have indirectly increased predation on fawn mule deer. However, it appears fawn:doe ratios in this herd are very sensitive to weather and habitat conditions. Additionally, since about 2006, there have been reports of dead deer each year in the early fall, and Epizootic Hemorrhagic Disease (EHD) was confirmed in a few cases.

Buck:doe ratios in this herd increased between 2003 and 2007, peaking at 45:100. Since then, they have declined and stabilized near the 10-year average (34:100). Until 2008, fair productivity coupled with limited access for hunters to private land yielded an increasing buck:doe ratio (despite enhanced license issuance). Since then, fawn production and survival have dropped resulting in a decline in buck ratios. Visibility of yearling bucks is high during classifications, and tracking yearling buck ratios provides managers with a good indication of recruitment into this population, given low harvest rates of yearling bucks.

HARVEST DATA: Most harvested mule deer are taken off private land because it provides the majority of mule deer habitat in the Herd Unit. The Department is currently attempting to balance desires of landowners and hunters to increase deer numbers, but still keep the population at levels that will reduce the chance of a large-scale die-off. Access to private lands for deer hunting continues to decrease due to leasing by outfitters and many landowners limiting hunting in the wake of declining deer numbers. Over the past two decades, outfitter control has significantly curtailed access to buck deer, and harvest of bucks dropped when seasons were liberalized in the mid 2000's. The reduced access to private land for deer hunters has increased hunting pressure on bucks on accessible public lands, and resulted in lower numbers of bucks there. Many landowners have stated, even when the population of deer was higher, that they are not willing to host increased numbers of hunters, or tolerate much in the way of doe/fawn hunting. Consequently, we have basically reached access saturation at this time on much of the private land in the herd unit.

Since 2006, hunter numbers and harvest have declined steadily, while hunter effort has increased. Initially, most of the decline in hunter numbers was due to a reduction in the number of non-residents hunting mule deer as the Region B quota has dropped. More recently, there has been a decline in resident hunters. Further, during each of past three hunting seasons, many complaints have been received from both hunters and landowners throughout the herd unit with regards to the low number of deer seen and harvested. It is evident from the reduced number of deer found during classification efforts, changes in harvest statistics, and landowner contacts that this herd declined substantially over the past three years.

POPULATION: The 2012 post-season population estimate for this herd was ~17,400. The population model suggests this population peaked near objective in 2000 and then dropped dramatically following the tough winter of 2000. The herd is projected to have rebounded between 2002 and 2006. It leveled off in 2007 at about 15% below objective, and has declined since.

The Semi-Constant Juvenile / Semi-Constant Adult (SCJ SCA) model was chosen to estimate this herd's population. It was selected over competing models because it had the lowest relative AICc (74), and model fit with observed buck ratios was very good. This model is also well correlated with changes in harvest statistics, as changes in preseason population estimates are

91% correlated with changes in hunter success, and inversely correlated 83% with changes in hunter effort since 2007. Modeled changes in population size also mirror impressions of field personnel and many landowners. Overall, this model is considered to be of good quality because it has 15⁺ years of data; ratio data are available for all years in model; juvenile and adult survival data were obtained from similar herds; it aligns fairly well with observed data; and results are biologically defensible.

MANAGEMENT SUMMARY: The traditional season dates for this herd unit are Oct. 1-15. In order to facilitate population growth commensurate with landowner desires, we have eliminated most doe/fawn harvest and continue antlered only General License seasons. Limited doe/fawn harvest will continue in HA 12, where a couple landowners are experiencing some damage and want to reduce mule deer numbers, and in the eastern quarter of HA 9 to allow landowners concerned with damage on Stockade Beaver Creek to address the issue if they choose.

Due to intense hunting pressure on public land there is a discrepancy in deer numbers and densities between private and public land areas. This is best exemplified in HA 10, which contains the highest proportion of public land in the herd unit. To address low buck numbers and hunter crowding in this area, we have been steadily reducing the Region B quota, running a short hunting season, and implemented a 3-point restriction in 2012. The combined strategy of limiting Region B licenses and conservative hunting seasons may be helping. The buck:doe ratio improved in HA 10 to the herd-wide average in 2009 and 2010, but deer densities remained depressed. However, in 2011, the observed buck:doe ratio in area 10 dropped to 16:100, as did the number of deer observed per hour of classification flight time. This led to the 3-point restriction implemented in 2012, and the post-season buck:doe ratio improved to 42:100 in 2012, but only 27 bucks were observed in over 4 hours of helicopter flight time post-season 2012.

Many landowners have stated they are not taking deer hunters this year, or are reducing the number they host. In addition, harvest statistics from HA 10 suggest non-resident hunters have outnumbered resident hunters 2:1 on public land, and as such the Region B quota has again been reduced. The Region B quota of 1,500 should allow all 1st choice applicants to draw a license; and the 2013 hunting season should result in harvest of about 1,150 bucks and 40 antlerless deer. Given average productivity and modeled survival rates, this harvest will essentially keep the post-season population unchanged into post-season 2013.

INPUT	
Species:	Mule Deer
Biologist:	Joe Sandrini
Herd Unit & No.:	Cheyenne R.
Model date:	02/14/13

☐ Clear form

MODELS SUMMARY				Notes
			Relative AICc	
			Fit	
C,J,CA	Constant Juvenile & Adult Survival		105	
SC,J,SCA	Semi-Constant Juvenile & Semi-Constant Adult Survival		33	
TS,J,CA	Time-Specific Juvenile & Constant Adult Survival		11	

Population Estimates from Top Model									
Year	Posthunt Population Est.		Trend Count	Predicted Prehunt Population		Predicted Posthunt Population		Objective	
	Field Est	Field SE		Juveniles	Total	Juveniles	Total		
1995				10622	30398	10532	3558	27375	38000
1996				12381	33294	12350	4112	30360	38000
1997				10682	33758	10629	5118	30714	38000
1998				12707	36378	12664	4916	32985	38000
1999				13847	39050	13786	4783	34591	38000
2000				14360	45492	14301	7050	41100	38000
2001				7712	32192	7625	4811	28210	38000
2002				7748	29863	7682	3769	26214	38000
2003				10290	30736	10208	3411	27621	38000
2004				9474	30648	9419	4033	27742	38000
2005				10314	31726	10210	4440	28875	38000
2006				10513	35216	10479	6119	32229	38000
2007				10193	35149	10146	6381	32108	38000
2008				8318	30631	8278	5399	28058	38000
2009				8220	30094	8172	5217	27455	38000
2010				6084	22851	6037	3681	20861	38000
2011				5913	20252	5876	3359	18781	38000
2012				4264	18848	4256	3340	17367	38000
2013				5299	18990	5294	2907	17678	38000
2014									38000
2015									38000
2016									38000
2017									38000
2018									38000
2019									38000
2020									38000
2021									38000
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2024									38000
2025									38000
2026									38000
2027									38000

Survival and Initial Population Estimates

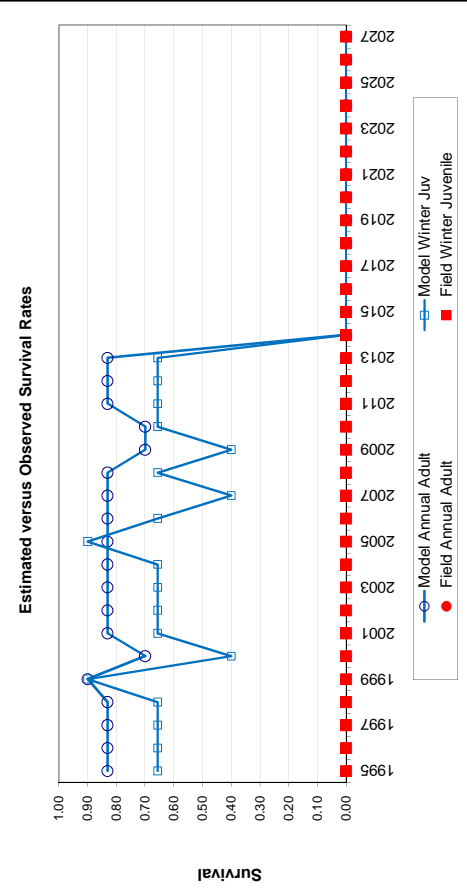
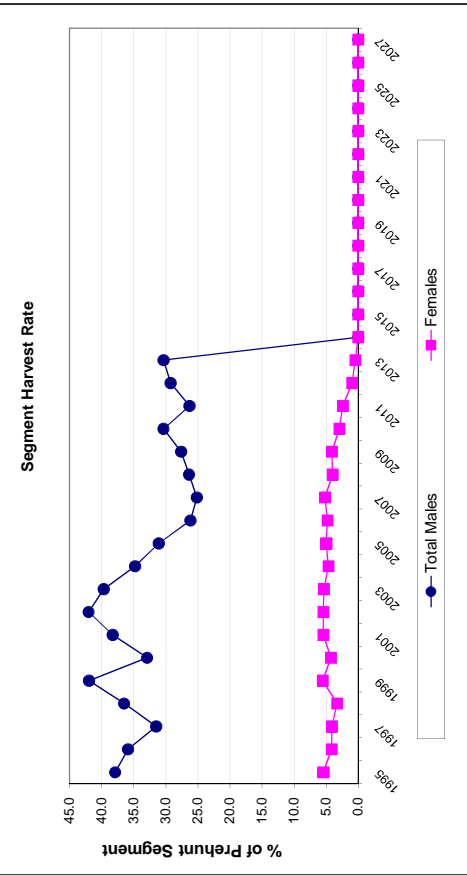
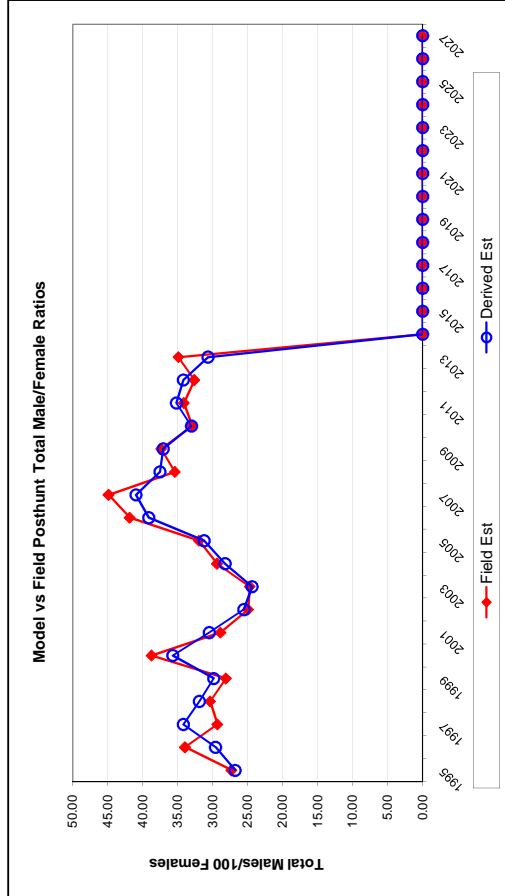
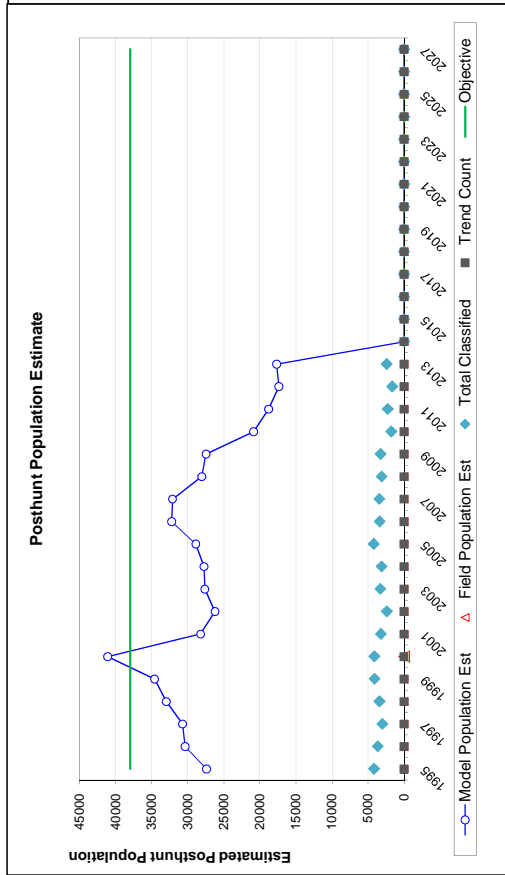
Year	Annual Juvenile Survival Rates		Annual Adult Survival Rates	
	Model Est	Field Est	Model Est	Field Est
1995	0.66		0.83	
1996	0.66		0.83	
1997	0.66		0.83	
1998	0.66		0.83	
1999	0.90		0.90	
2000	0.40		0.70	
2001	0.66		0.83	
2002	0.66		0.83	
2003	0.66		0.83	
2004	0.66		0.83	
2005	0.90		0.83	
2006	0.66		0.83	
2007	0.40		0.83	
2008	0.66		0.83	
2009	0.40		0.70	
2010	0.66		0.70	
2011	0.66		0.83	
2012	0.66		0.83	
2013	0.66		0.83	
2014				
2015				
2016				
2017				
2018				
2019				
2020				
2021				
2022				
2023				
2024				
2025				
2026				
2027				

Parameters:		Optim cells
Juvenile Survival =		0.656
Adult Survival =		0.831
Initial Total Male Pop/10,000 =		0.356
Initial Female Pop/10,000 =		1.329

MODEL ASSUMPTIONS	
Sex Ratio (% Males) =	50%
Wounding Loss (total males) =	10%
Wounding Loss (females) =	10%
Wounding Loss (juveniles) =	10%

Year	Classification Counts						Harvest			
	Juvenile/Female Ratio			Total Male/Female Ratio			Segment Harvest Rate (% of			
	Derived Est	Field Est	Field SE	Derived Est	Field Est w/o bull adj	Field SE	Juv	Males	Females	Total Harvest
1995		79.28	2.65	26.78	27.32	1.31	82	1973	693	2748
1996		88.87	3.20	29.59	33.94	1.67	28	2092	547	2667
1997		71.01	2.84	34.20	29.32	1.59	49	2139	579	2767
1998		82.20	3.05	31.91	30.37	1.57	39	2569	476	3084
1999		86.05	2.89	29.85	28.11	1.37	55	3145	854	4054
2000		72.41	2.53	35.70	38.72	1.66	54	3144	794	3992
2001		48.34	1.99	30.50	28.88	1.44	79	2713	828	3620
2002		52.04	2.42	25.53	24.94	1.52	60	2484	773	3317
2003		72.90	2.75	24.36	24.70	1.36	75	2039	718	2832
2004		65.91	2.62	28.22	29.38	1.54	50	1956	635	2641
2005		71.78	2.45	31.22	31.96	1.43	94	1821	677	2592
2006		67.04	2.63	39.14	41.85	1.91	31	1970	715	2716
2007		65.12	2.57	40.95	44.86	1.99	43	1949	773	2765
2008		57.57	2.37	37.54	35.39	1.72	36	1758	545	2339
2009		58.09	2.35	37.08	37.35	1.75	44	1807	548	2399
2010		54.17	2.97	33.03	32.95	2.15	43	1459	307	1809
2011		61.56	2.93	35.19	34.11	1.99	33	1090	214	1337
2012		43.56	2.59	34.18	32.62	2.15	7	1255	84	1346
2013		55.85	2.62	30.67	34.89	1.93	5	1151	37	1193
2014										
2015										
2016										
2017										
2018										
2019										
2020										
2021										
2022										
2023										
2024										
2025										
2026										
2027										




FIGURES

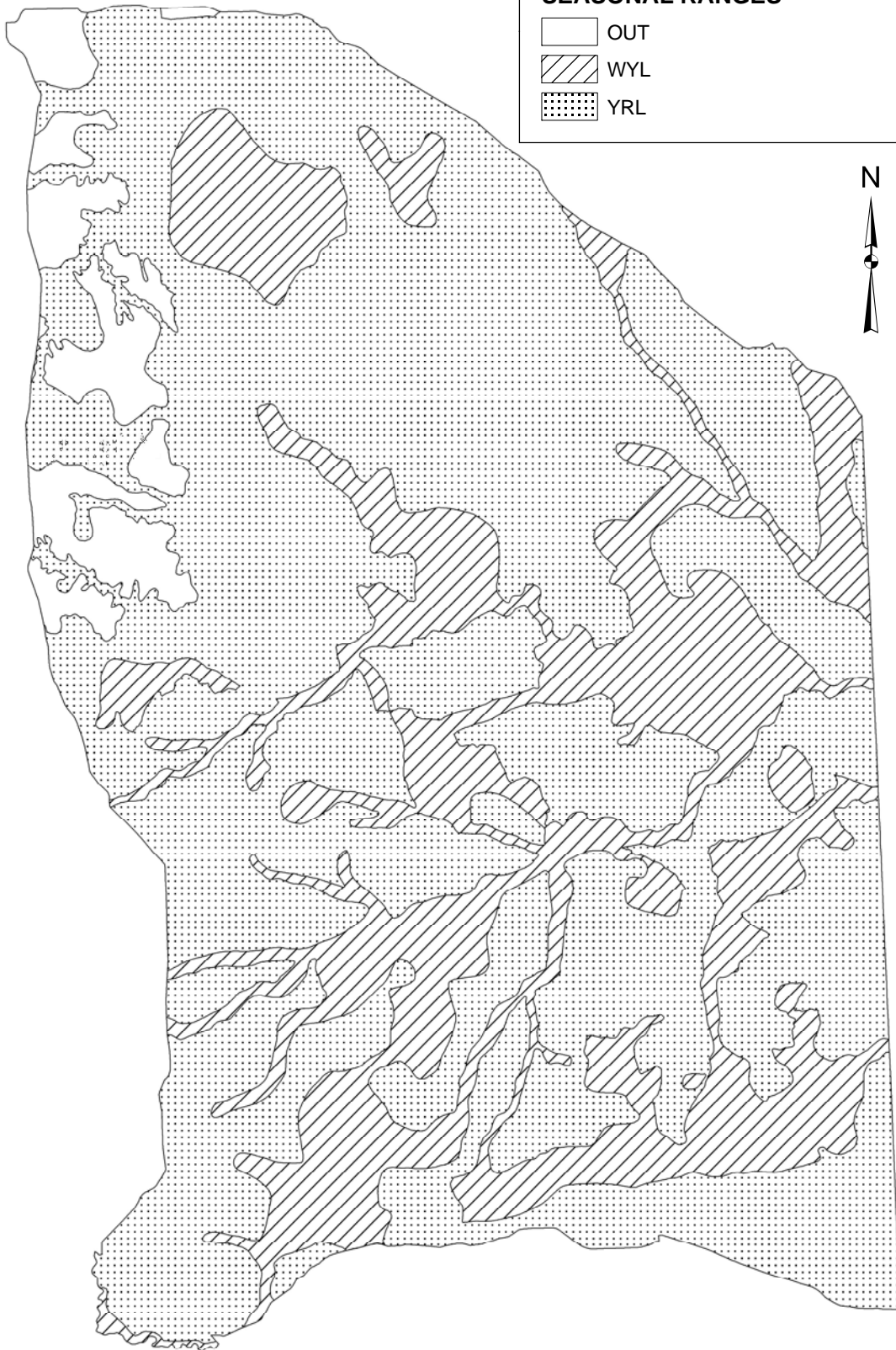


Comments:

END

Mule Deer (MD 740) Cheyenne River
SEASONAL RANGES

-  OUT
-  WYL
-  YRL



2012 - JCR Evaluation Form

SPECIES: Mule Deer

PERIOD: 6/1/2012 - 5/31/2013

HERD: MD751 - BLACK HILLS

HUNT AREAS: 1-6

PREPARED BY: JOE SANDRINI

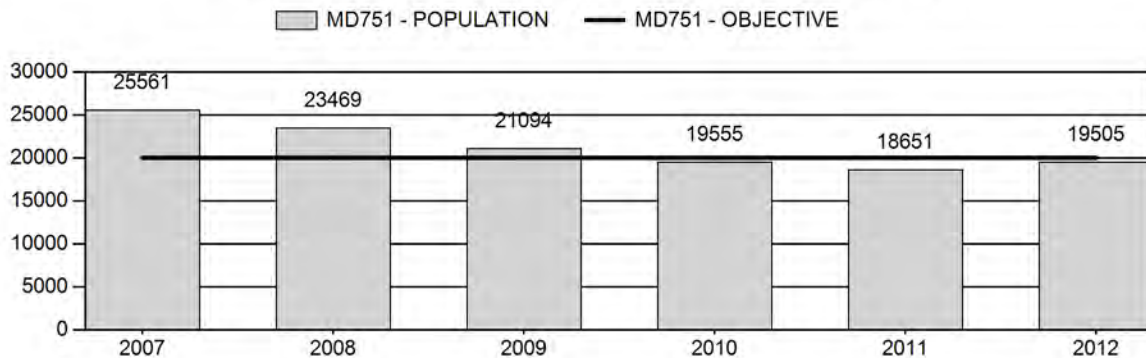
	<u>2007 - 2011 Average</u>	<u>2012</u>	<u>2013 Proposed</u>
Population:	21,666	19,505	19,110
Harvest:	2,447	1,442	1,448
Hunters:	5,725	3,569	3,587
Hunter Success:	43%	40%	40%
Active Licenses:	5,983	3,621	3,634
Active License Percent:	41%	40%	40%
Recreation Days:	18,446	11,435	11,471
Days Per Animal:	7.5	7.9	7.9
Males per 100 Females	18	16	
Juveniles per 100 Females	69	76	

Population Objective:	20,000
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	-2.5%
Number of years population has been + or - objective in recent trend:	4
Model Date:	04/09/2013

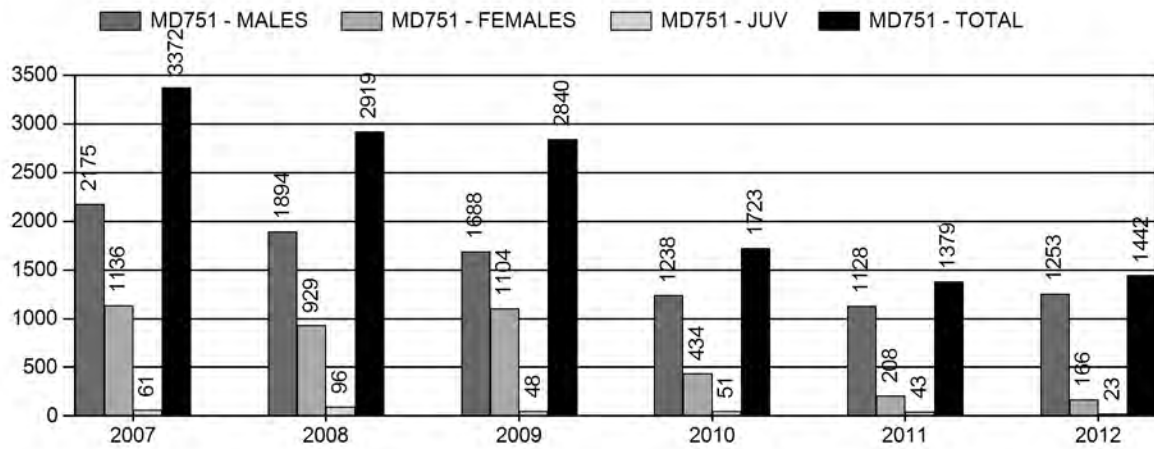
Proposed harvest rates (percent of pre-season estimate for each sex/age group):

	<u>JCR Year</u>	<u>Proposed</u>
Females \geq 1 year old:	1.8%	1.8%
Males \geq 1 year old:	45.6%	44.1%
Juveniles (< 1 year old):	0.3%	0.4%
Total:	7.5%	7.7%
Proposed change in post-season population:	+4.6%	-2.0%

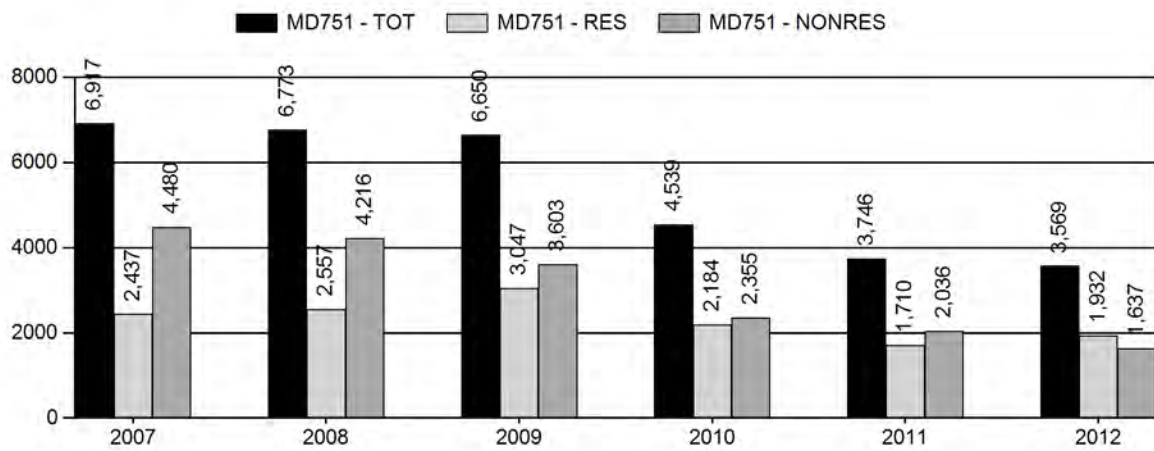
Population Size - Postseason



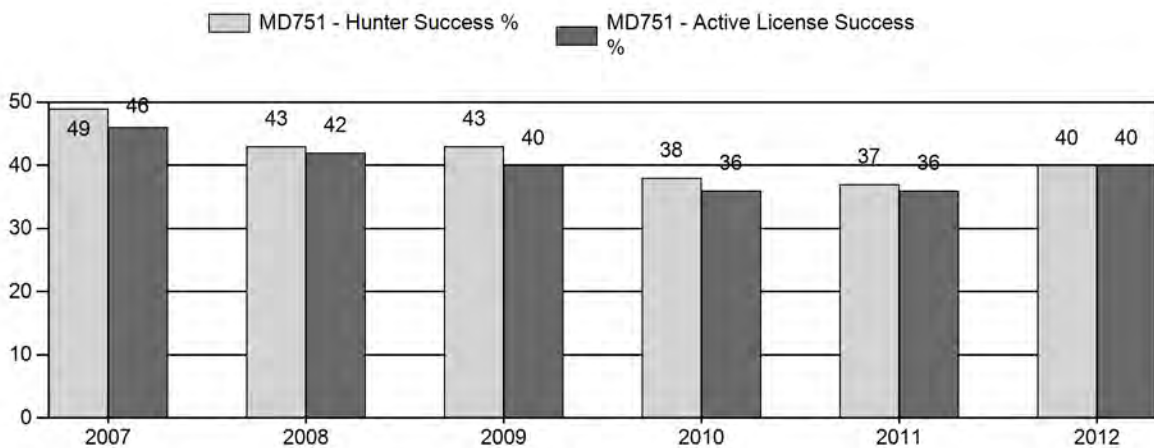
Harvest



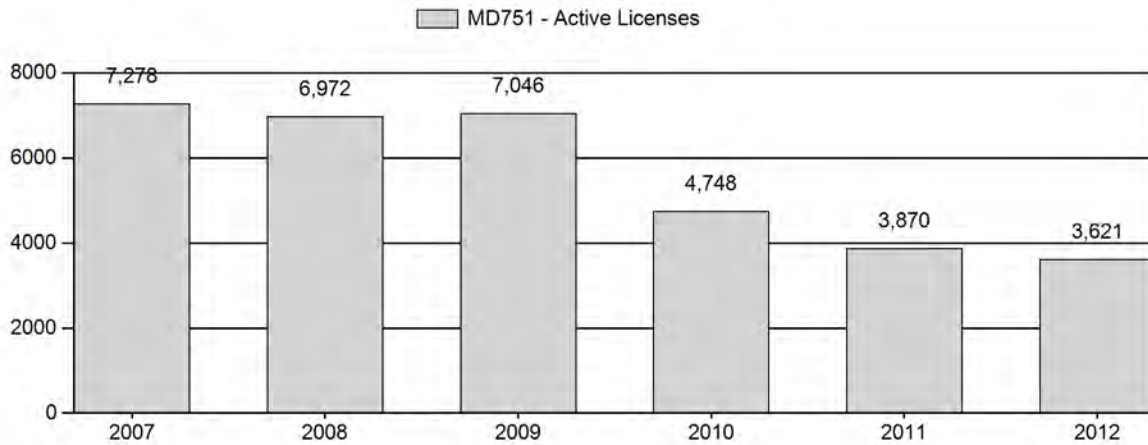
Number of Hunters



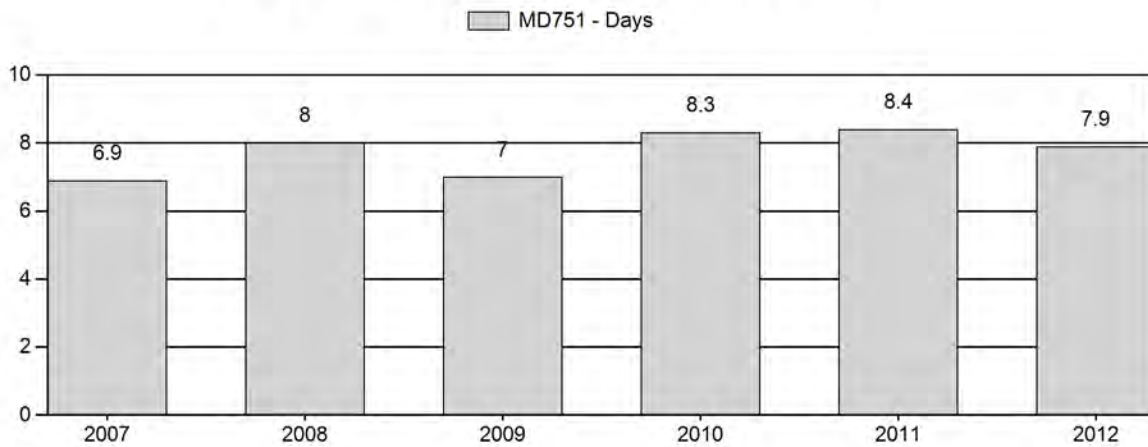
Harvest Success



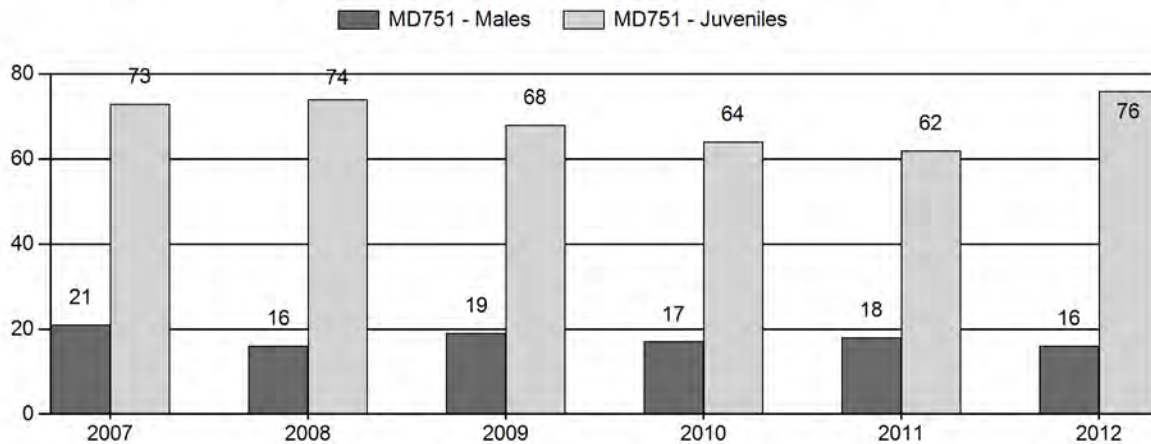
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2007 - 2012 Postseason Classification Summary

for Mule Deer Herd MD751 - BLACK HILLS

Year	Post Pop	MALES				FEMALES		JUVENILES		Tot Cls	Cls Obj	Males to 100 Females				Young to		
		Ylg	Adult	Total	%	Total	%	Total	%			Ylg	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2007	25,561	76	108	184	11%	856	52%	622	37%	1,662	1,515	9	13	21	± 2	73	± 5	60
2008	23,469	73	103	176	9%	1,085	52%	806	39%	2,067	1,505	7	9	16	± 2	74	± 4	64
2009	21,094	48	52	100	10%	522	53%	357	36%	979	1,317	9	10	19	± 3	68	± 6	57
2010	19,555	44	71	115	10%	659	55%	421	35%	1,195	1,174	7	11	17	± 2	64	± 5	54
2011	18,651	41	76	117	10%	658	56%	406	34%	1,181	1,118	6	12	18	± 2	62	± 5	52
2012	19,505	58	70	128	8%	787	52%	596	39%	1,511	1,553	7	9	16	± 2	76	± 5	65

**2013 HUNTING SEASONS
BLACK HILLS MULE DEER HERD (MD751)**

Hunt Area	Type	Season Dates		Quota	Limitations
Opens	Closes				
1		Nov. 1	Nov. 22		General license; antlered deer off private land; any deer on private land
1, 2, 3	6	Nov. 1	Nov. 22	25	Limited quota licenses; doe or fawn valid on private land
2		Nov. 1	Nov. 22		General license; antlered deer off private land; any deer on private land
3		Nov. 1	Nov. 22		General license; antlered deer off private land; any deer on private land
4		Nov. 1	Nov. 20		General license; antlered deer off private land; any deer on private land except the lands of the State of Wyoming's Ranch A property shall be closed
4	6	Nov. 1	Nov. 20	150	Limited quota licenses; doe or fawn valid on private land
5		Nov. 1	Nov. 20		General license, antlered deer off private land; any deer on private land
	6	Nov. 1	Nov. 20	25	Limited quota licenses; doe or fawn
6		Nov. 1	Nov. 20		General license; antlered deer off private land; any deer on private land
6, 9	6	Nov. 1	Nov. 20	25	Limited quota licenses; doe or fawn valid in those portions of Area 6 and Area 9 east of U.S. Highway 85
Archery		Sept. 1	Sept. 30		Refer to license type and limitations in Section 3

Region A Nonresident Quota: 2,750

Hunt Area	License Type	Quota change from 2012
Herd Unit Totals	All	None
	Region A	None

Management Evaluation

Current Postseason Population Management Objective: 20,000

Management Strategy: Recreational

2012 Postseason Population Estimate: ~ 19,500

2013 Proposed Postseason Population Estimate: ~ 19,100

HERD UNIT ISSUES: The management objective of the Black Hills Mule Herd Unit is an estimated post-season population of 20,000 mule deer, and herd's management strategy is recreational management. It is managed for recreational hunting to limit deer numbers to a level compatible with landowner desires. The population objective and management strategy were set in 1986. The objective and management strategy are scheduled for review during bio-year 2014.

The Black Hills mule deer herd unit encompasses 3,181 mi² of occupied habitat. Seventy-six percent of the land in this herd unit is privately owned. Significant blocks of accessible public land are found on the Black Hills National Forest in Hunt Area (HA) 2 and HA 4, and on the Thunder Basin National Grassland in HA 6. A block of BLM land with a couple of access points is also present in HA 1. Because the majority of private landowners charge high access fees for hunting, these parcels of public land receive greater hunting pressure than private lands.

Historically, management of this herd has been a by-product of managing the Black Hills White-Tailed Deer Herd. Deer hunting seasons have been primarily structured to address the white-tailed deer population. As with many of the herd units in the eastern half of Wyoming, the Game & Fish Department has tried to maintain deer numbers at levels acceptable to landowners. In the case of these two deer herds, landowners typically feel saturated with white-tailed deer before mule deer become a problem.

WEATHER: Drought conditions, which were persistent throughout the Black Hills between 2000 and 2007, began to moderate in 2008. Between 2008 and 2012, annual temperatures were below the previous 30-year average and annual precipitation each year above the previous 30-year average; and 2010 was significantly colder and wetter than both the 30-year and 100-year averages (<http://lwf.ncdc.noaa.gov/temp-and-precip/time-series>). The predominant weather pattern was characterized by generally cool summers, more persistent snow cover in late fall and winter, and above normal spring moisture. Notably, the winter of 2010-11 saw periods of extended low temperatures and persistent, deep snow cover rivaled only five times previous since the late 1890's. This tough winter preceded bio-year 2012, which was one of the driest on record. Warm and dry conditions beset the area in April of 2012, and continued through the 2012-13 winter. April of 2013 finally saw a break in this pattern when temperatures dropped below normal for the entire month and significant precipitation was again received (<http://www.ncdc.noaa.gov/temp-and-precip/>). Overall, the weather pattern during bio-year 2012 resulted in poor forage production and led to several large wildfires in the southern half of

the herd unit. This recent weather pattern resulted in below average recruitment, and about average over-winter survival of all age classes of mule deer.

HABITAT: Ponderosa pine (*Pinus ponderosa*) is the dominant overstory species on forested lands. Quaking aspen (*Populus tremuloides*), paper birch (*Betula papyrifera*), and bur oak (*Quercus macrocarpa*) stands are present. Important shrubs include big sagebrush and silver sage (*Artemisia spp.*), Saskatoon serviceberry (*Amelanchier alnifolia*), Oregon grape (*Berberis repens*), common chokecherry (*Prunus virginiana*), spiraea (*Spiraea betulifolia*), and true mountain mahogany (*Cercocarpus montanus*). Many non-timbered lands in the DAU are dominated by sagebrush or are used to produce agricultural crops such as winter wheat (*Triticum aestivum*), alfalfa hay (*Medicago sativa*), and grass hay.

Currently, little quantified habitat evaluation is being conducted within this herd unit directly applicable to mule deer. A single true mountain mahogany and two bur oak production and utilization transects have been established. The true mountain mahogany transect is located on mule deer winter range typical of the southern Black Hills, and the bur oak transects are in winter range more typical of white-tailed deer habitat in the northern hills. While little habitat data overall have been collected, it appears drought conditions have negatively affected shrub production, and the peak in mule deer numbers several years ago may have approached what forage conditions could sustain between bio-years 2005 and 2008.

FIELD DATA: Between 2002 and 2005, fawn survival was fair, with observed pre-season fawn:doe ratios averaging 67:100. Fawn:doe ratios then increased about 15% the next three years (mean₍₂₀₀₆₋₂₀₀₈₎ = 77:100) before dropping 16% between 2009 and 2011 (mean₍₂₀₀₉₋₂₀₁₁₎ = 65:100). Thus, it appears the population decline experienced after 2006 was likely due initially to increased harvest rates and a drop in over-winter survival, while increased non-hunting mortality augmented the decline beginning in 2009. In addition, an usually severe winter in bio-year 2010 and localized epizootic hemorrhagic disease (EHD) outbreaks each of the past five summers have increased annual mortality of all age classes. During the 2007-2010 period, evidence suggests the mountain lion population in the Black Hills reached historically high levels. As a result, harvest, weather conditions, disease, and increased predation have all acted to cause the estimated post-season population to fall 36% between 2006 and 2011. This same period witnessed a 39% decline in the estimated pre-season population, while pre-season trend counts dropped 75% (Figure 1).

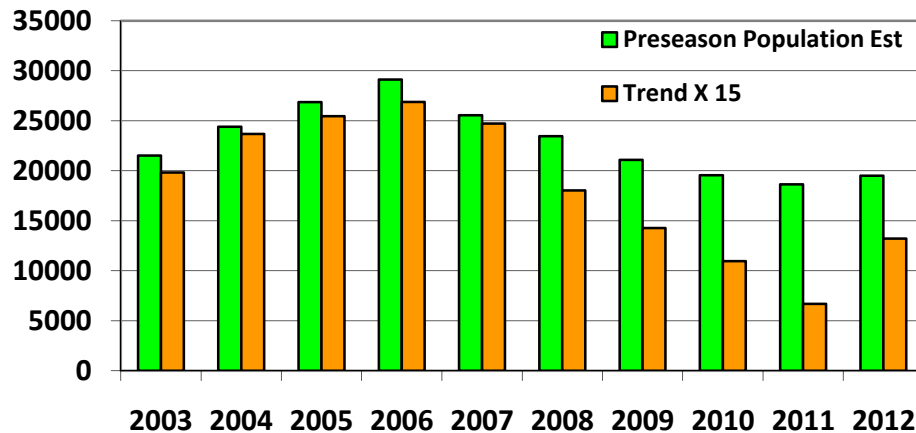


Figure 1. 2003 – 2012 pre-season population estimate produced by TSJ CA model and mule deer observed preseason along trend count routes, increased by a factor of 15.

As this herd grew rapidly between 1997 and 2000, conservative hunting seasons allowed post-season buck:doe ratios to increase. Then, as Region A license issuance increased, buck:doe ratios declined before leveling off at about 22:100 during a time of good fawn survival. However, as this population began to drop in 2007, buck:doe ratios again dipped. Since 2001, post-season buck:doe ratios in this herd have averaged 20:100 (std. dev = 4), but a mere 16:100 (std. dev.=1) over the past five years. As such, this herd generally exhibits buck:doe ratios at the very bottom end, or below, the Department's management criteria for recreational hunting.

HARVEST DATA: Deer seasons in the Black Hills have been traditionally structured to address white-tailed deer management. Consequently, this mule deer herd is managed by balancing white-tailed deer seasons and landowner tolerance for deer (both species) with recreational opportunity. An analysis of harvest information shows the number of hunters in the field pursuing bucks has the greatest impact on total harvest. As such, buck harvest has been regulated by altering non-resident hunter numbers via changes in the Region A quota, while resident buck hunter participation can only be limited by shortening the season – notably by inclusion or removal of the Thanksgiving Day weekend and the days following in November. Department surveys and contacts with non-resident hunters indicate most non-residents want to harvest buck mule deer. This fact, combined with a hunting season that targets bucks during the rut, results in very heavy hunting pressure on buck mule deer. Considering this, and the drop in total buck numbers since 2007, it is prudent to limit harvest of buck mule deer.

With more conservative hunting season structures in place since 2010, mule deer harvest has dropped. At the same time, hunter success has generally declined and effort increased. Hunting seasons the past three years reduced harvest of mule deer bucks 43% from that experienced during the traditional 30 day November season the preceding three years. Comparing these same time periods, resident harvest of mule deer bucks dropped 30%, while non-resident harvest of mule deer bucks dropped 50%. During this time frame, harvest of white-tailed deer bucks declined less (see WD706). Despite these trends, hunter satisfaction essentially remained unchanged for both species the past two years, with about 67% of the hunters reporting they were either satisfied or very satisfied with their Black Hills deer hunt, and 18% reporting they were either dissatisfied or very dissatisfied – regardless of species.

POPULATION: The 2012 estimated, post-season population of Black Hills mule deer was about 19,500. The Black Hills mule deer population peaked at an estimated postseason population of around 29,000 mule deer in 2006, and then declined the next five years, and appears to have stabilized slightly below objective. The last substantial population decline this herd experienced was in the mid 1990's. That drop was reversed in 1998 and 1999 when very conservative hunting seasons aligned with excellent fawn survival and mild winters.

Population modeling of this herd is very difficult. The herd unit violates the closed population assumption of the model. Mule deer regularly cross into the Power River Herd Unit, Montana, South Dakota and the Cheyenne River Herd Unit, as no physical barriers exist to prevent movement. Difficulties modeling this herd with POP II were not ameliorated with the change to spreadsheet modeling. The spreadsheet model chosen to estimate this population was the Time Sensitive Juvenile / Constant Adult survival rate model (TSJ CA), because it had the lowest AICc (125) and best fit observed buck:doe ratios. However, this model reached upper or lower constraints on juvenile survival in 8 out of 20 years modeled, and was very close to constraints in 4 additional years. Overall, we consider this model to be of fair to poor quality due to the lack of herd specific survival data, violations of the closed population assumption, below adequate classification sample sizes some years, and aerial classifications in terrain that makes classifying yearling bucks difficult.

MANAGEMENT SUMMARY: The spreadsheet model suggests recent postseason populations have been very close to our current management objective of 20,000 mule deer, rather than the approximately 13,000 projected by POP II over the past couple of years – which may or may not be the case. If it is, then our current objective is well below landowner desires. At this time, many landowners have expressed dissatisfaction with the number of mule deer. Based upon habitat conditions and these desires, a season designed to increase this herd is warranted. However, given the low productivity and survival witnessed the past several years, growing the population without nearly closing down buck harvest will not happen. Instead, the 2013 hunting season is designed to allow hunting opportunity identical to 2012. Antlerless harvest on doe/fawn tags has been reduced in recent years with the creation of a type 8 tag valid on private land for doe/fawn white-tailed deer north of I-90; and last fall's hunting season resulted in the take of about 135 antlerless mule deer on General Licenses, and another 55 or so on type 6 doe/fawn tags. This low level of female and juvenile mule deer harvest does not seem to warrant complicating the regulations further, a move opposed by many landowners.

There are no changes to the 2013 mule deer hunting season in the Black Hills. Retention of the November 22nd closing date in Hunt Areas 1, 2, & 3 will maintain three full weekends of deer hunting. Staying with a Thanksgiving Day closing date would add another full week and weekend of hunting to the season beyond what has been in place the past three years. The mule deer buck numbers are too depressed to warrant such hunting pressure during the peak of the rut. Continuing with a Region A license quota identical to last year is also intended to limit harvest of mule deer bucks. The proposed season is expected to yield a 2013 postseason population of about 19,100 mule deer, which represents a 2% decrease in the current post-season population. However, the herd will remain within 5% of objective.

INPUT	
Species:	Mule Deer
Biologist:	Joe Sandrini
Herd Unit & No.:	Black Hills
Model date:	04/09/13

MODELS SUMMARY				Notes
			Relative AICc	
			Fit	
			Check best model to create report	
C,J,CA	Constant Juvenile & Adult Survival		278	<input type="checkbox"/> C,J,CA Model
SC,J,SCA	Semi-Constant Juvenile & Semi-Constant Adult Survival	134	198	<input type="checkbox"/> SC,J,SCA
TS,J,CA	Time-Specific Juvenile & Constant Adult Survival	25	125	<input checked="" type="checkbox"/> TS,J,CA Model

Population Estimates from Top Model									
Year	Posthunt Population Est. Field Est	Field SE	Trend Count	Predicted Prehunt Population		Predicted Posthunt Population		Objective	
				Juveniles	Total	Juveniles	Total	Total Males	Females
1995				6573	19197	6511	1928	16885	20000
1996			9750	6570	18936	6549	1761	16912	20000
1997			6750	4092	15581	4057	1263	13651	20000
1998			8835	7241	19104	7208	1363	17299	20000
1999			13530	8751	23874	8738	2530	21777	20000
2000			15780	8331	27355	8310	4098	25023	20000
2001			9225	6659	24316	6611	3004	21747	20000
2002			14715	8300	25411	8263	2638	23010	20000
2003			19830	7692	24592	7619	1971	21524	20000
2004			23685	9234	27992	9172	2365	24413	20000
2005			25455	9490	30547	9421	3307	26877	20000
2006			26880	11825	32704	11726	3234	29133	20000
2007			24720	9678	29267	9611	2721	25558	20000
2008			18030	9184	26677	9078	2167	23466	20000
2009			14280	7784	24216	7731	2057	21092	20000
2010			10965	6920	21447	6863	1945	19552	20000
2011			6690	6458	20166	6411	1848	18649	20000
2012			13215	7719	21091	7694	1652	19505	20000
2013				7154	20703	7129	1750	19110	20000
2014									20000
2015									20000
2016									20000
2017									20000
2018									20000
2019									20000
2020									20000
2021									20000
2022									20000
2023									20000
2024									20000
2025									20000
2026									20000

Survival and Initial Population Estimates

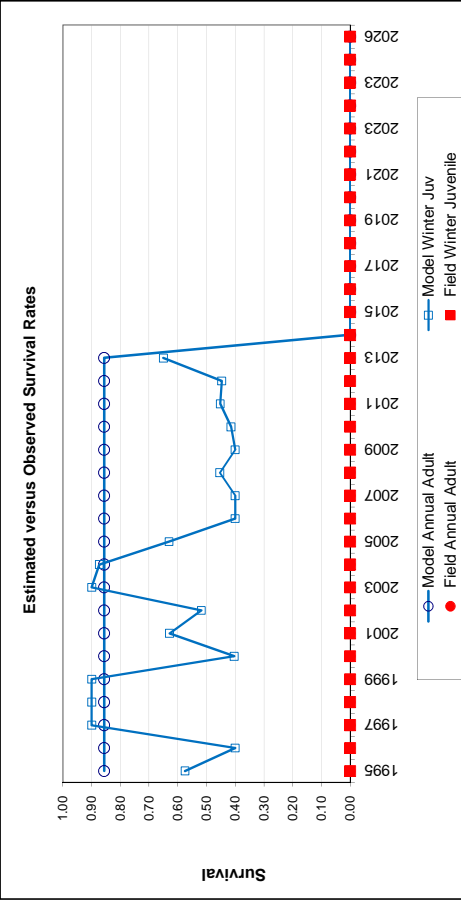
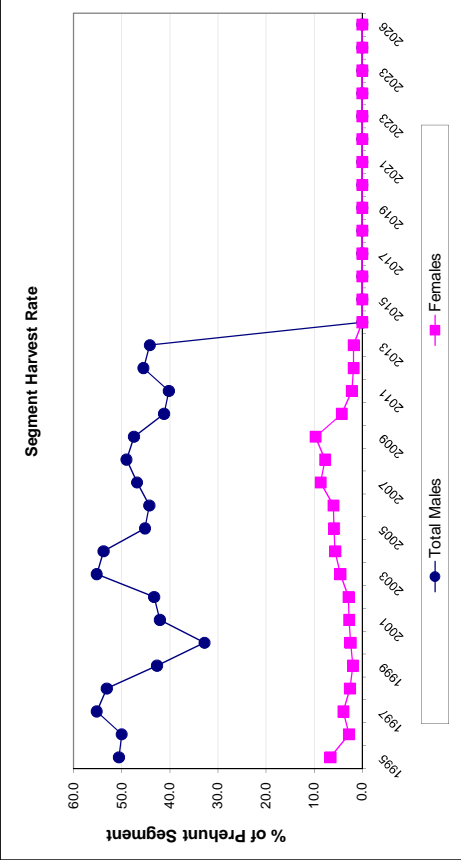
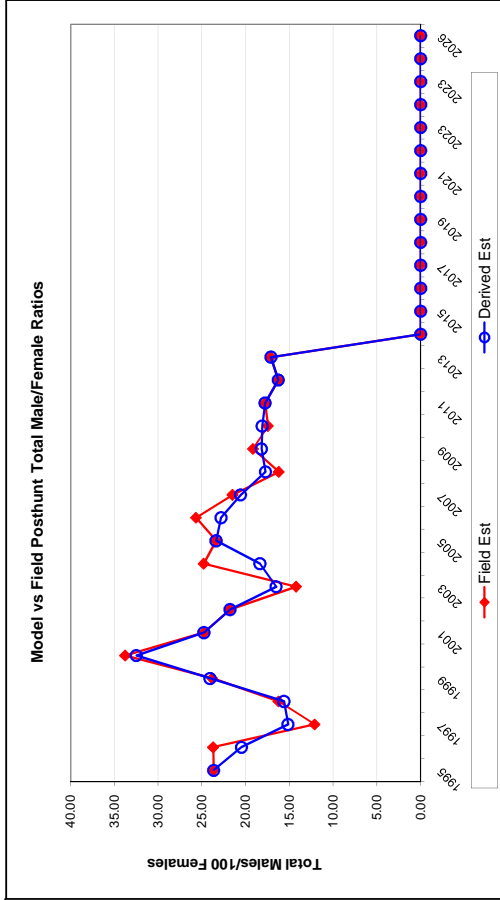
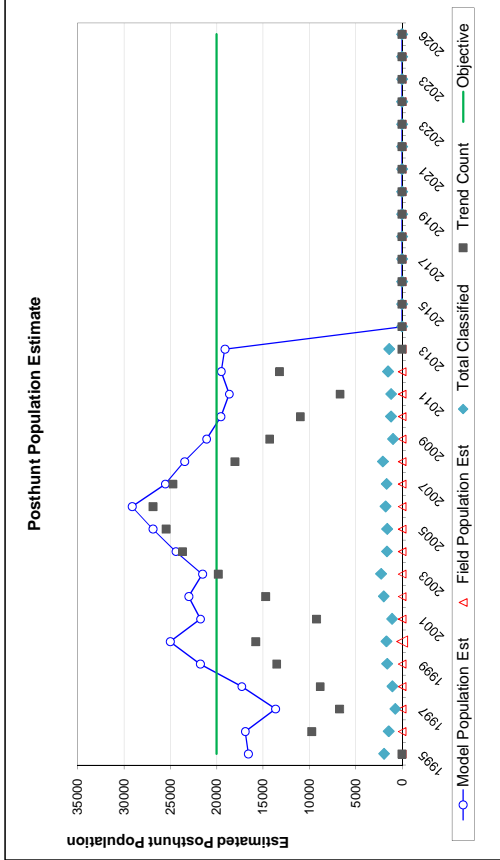
Year	Annual Juvenile Survival Rates		Annual Adult Survival Rates	
	Model Est	Field Est	Model Est	Field Est
1995	0.57		0.86	
1996	0.40		0.86	
1997	0.90		0.86	
1998	0.90		0.86	
1999	0.90		0.86	
2000	0.40		0.86	
2001	0.63		0.86	
2002	0.52		0.86	
2003	0.90		0.86	
2004	0.87		0.86	
2005	0.63		0.86	
2006	0.40		0.86	
2007	0.40		0.86	
2008	0.45		0.86	
2009	0.40		0.86	
2010	0.41		0.86	
2011	0.45		0.86	
2012	0.45		0.86	
2013	0.65		0.86	
2014				
2015				
2016				
2017				
2018				
2019				
2020				
2021				
2022				
2023				
2024				
2025				
2026				

Parameters:		Optim cells
Adult Survival =		0.856
Initial Total Male Pop/10,000 =		0.193
Initial Female Pop/10,000 =		0.815

MODEL ASSUMPTIONS	
Sex Ratio (% Males) =	50%
Wounding Loss (total males) =	10%
Wounding Loss (females) =	10%
Wounding Loss (juveniles) =	10%

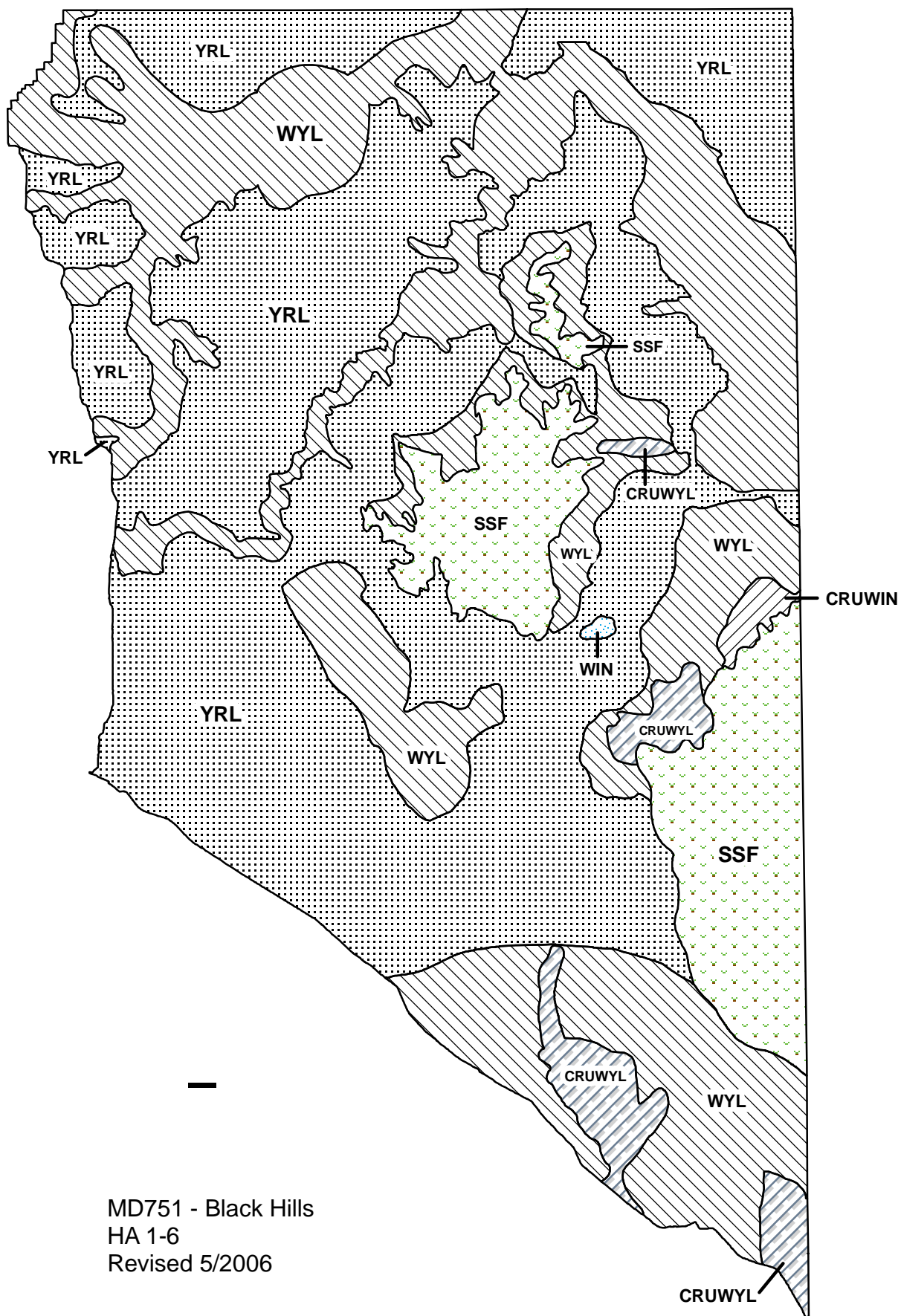
Year	Classification Counts						Harvest			
	Juvenile/Female Ratio			Total Male/Female Ratio			Segment Harvest Rate (% of			
	Derived Est	Field Est	Field SE	Derived Est	Field Est w/o bull adj	Field SE	Juv	Males	Females	Total Harvest
1995		79.92	3.89	23.66	23.66	1.75	57	1793	524	2374
1996		76.14	4.31	20.48	23.72	2.02	19	1600	221	1840
1997		48.70	3.96	15.16	12.12	1.72	32	1413	310	1755
1998		82.60	5.37	15.62	16.25	1.90	30	1403	208	1641
1999		83.14	4.43	24.07	23.81	1.95	12	1710	185	1907
2000		65.88	3.60	32.49	33.77	2.31	19	1817	284	2120
2001		54.49	3.74	24.76	24.75	2.26	44	1982	309	2335
2002		68.23	3.32	21.78	21.79	1.60	34	1828	320	2182
2003		63.84	2.87	16.51	14.23	1.13	67	2205	517	2789
2004		71.24	3.83	18.37	24.79	1.93	56	2500	698	3254
2005		66.59	3.62	23.38	23.38	1.85	63	2476	798	3337
2006		82.73	4.20	22.82	25.67	1.94	90	2333	823	3246
2007		72.66	3.83	20.57	21.50	1.75	61	2175	1136	3372
2008		74.29	3.45	17.73	16.22	1.32	96	1884	929	2919
2009		68.39	4.70	18.20	19.16	2.09	48	1688	1104	2840
2010		63.88	3.99	18.10	17.45	1.76	51	1238	434	1723
2011		61.70	3.89	17.78	17.78	1.78	43	1128	208	1379
2012		75.73	4.11	16.26	16.26	1.55	23	1253	166	1442
2013		69.68	3.99	17.10	17.12	1.64	23	1258	167	1448
2014										
2015										
2016										
2017										
2018										
2019										
2020										
2021										
2022										
2023										
2024										
2025										
2026										

FIGURES



Comments:

END



MD751 - Black Hills
 HA 1-6
 Revised 5/2006

2012 - JCR Evaluation Form

SPECIES: Mule Deer

PERIOD: 6/1/2012 - 5/31/2013

HERD: MD755 - NORTH CONVERSE

HUNT AREAS: 22

PREPARED BY: ERIKA
PECKHAM

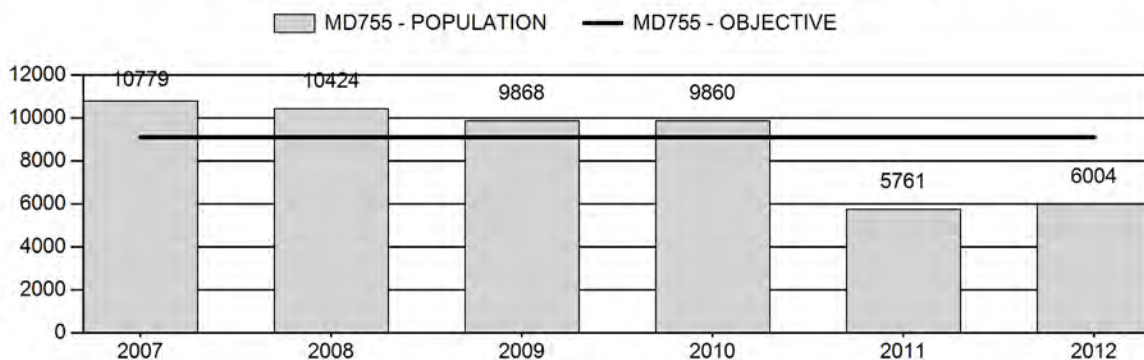
	<u>2007 - 2011 Average</u>	<u>2012</u>	<u>2013 Proposed</u>
Population:	9,338	6,004	6,020
Harvest:	766	451	430
Hunters:	888	550	550
Hunter Success:	86%	82%	78%
Active Licenses:	952	577	580
Active License Percent:	80%	78%	74%
Recreation Days:	3,422	2,050	2,050
Days Per Animal:	4.5	4.5	4.8
Males per 100 Females	48	34	
Juveniles per 100 Females	70	75	

Population Objective: 9,100
 Management Strategy: Special
 Percent population is above (+) or below (-) objective: -34.0%
 Number of years population has been + or - objective in recent trend: 1
 Model Date: 03/07/2013

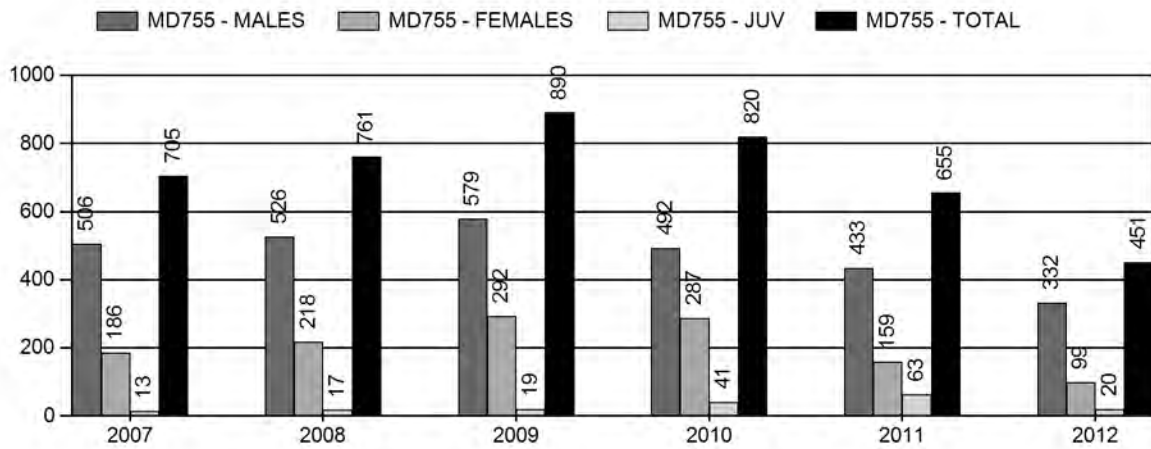
Proposed harvest rates (percent of pre-season estimate for each sex/age group):

	<u>JCR Year</u>	<u>Proposed</u>
Females \geq 1 year old:	2%	3.3%
Males \geq 1 year old:	18.7%	23.3%
Juveniles (< 1 year old):	.2%	0%
Total:	5.54%	6.6%
Proposed change in post-season population:	-6.9%	.3%

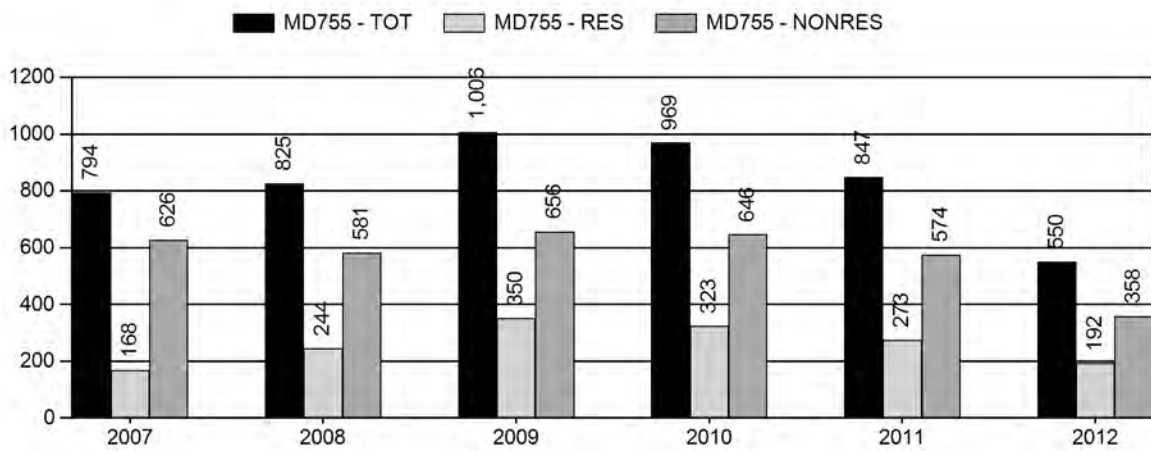
Population Size - Postseason



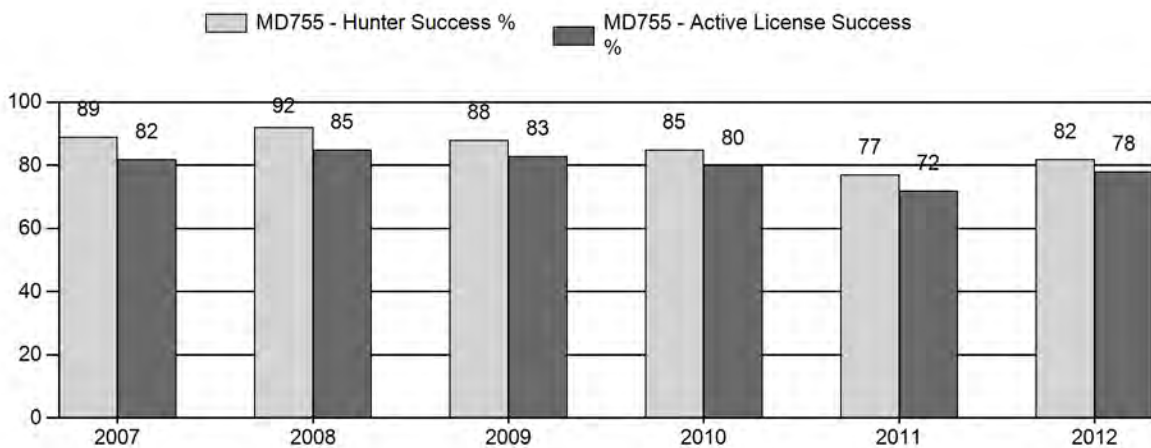
Harvest



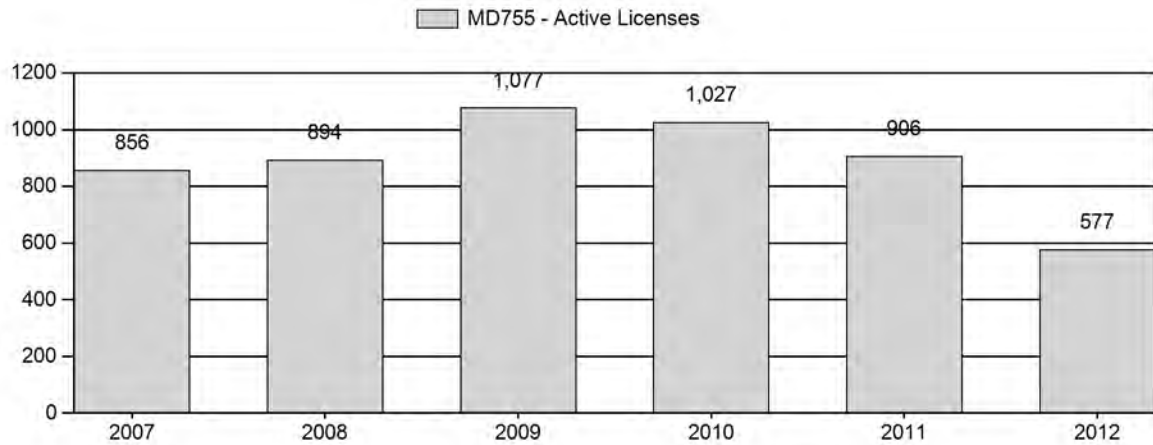
Number of Hunters



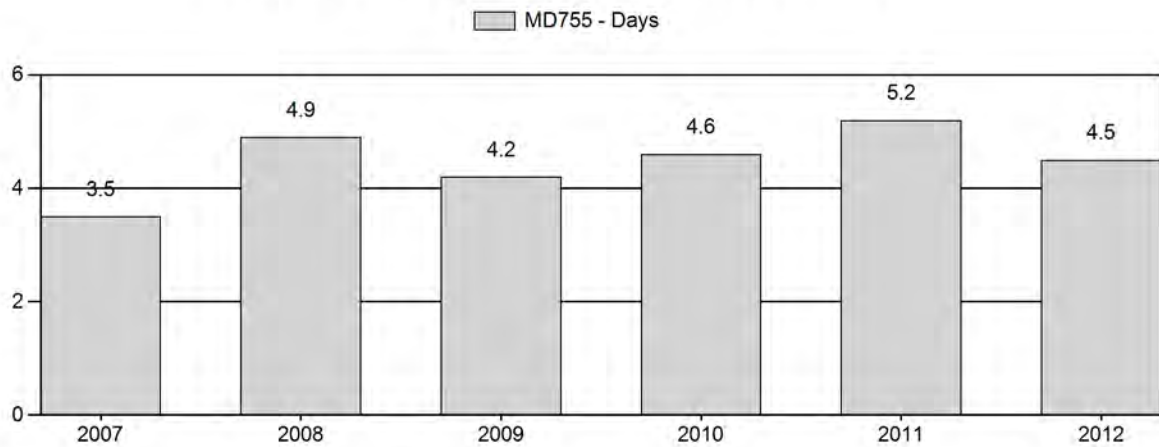
Harvest Success



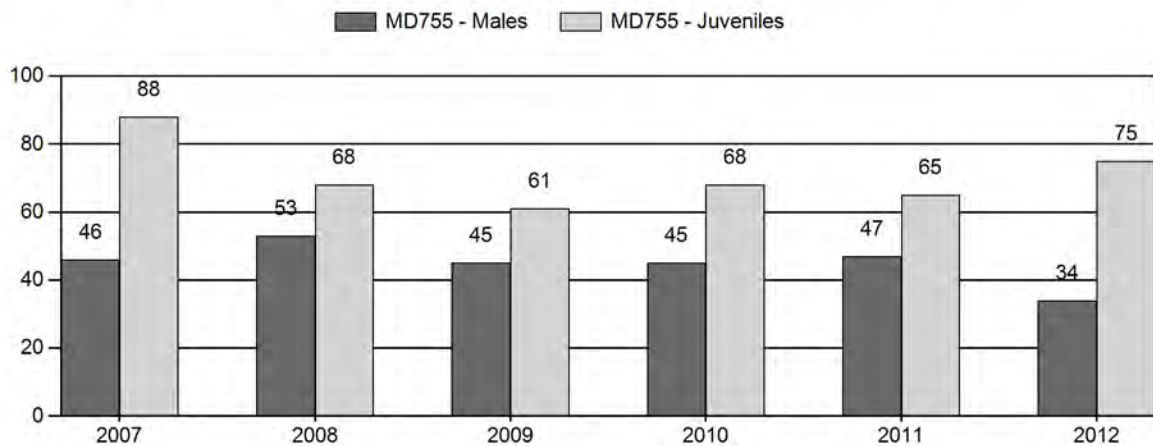
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2007 - 2012 Postseason Classification Summary

for Mule Deer Herd MD755 - NORTH CONVERSE

Year	Post Pop	MALES				FEMALES		JUVENILES		Tot Cls	Cls Obj	Males to 100 Females				Young to		
		Ylg	Adult	Total	%	Total	%	Total	%			Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2007	10,779	71	111	182	20%	392	43%	345	38%	919	1,200	18	28	46	± 5	88	± 8	60
2008	10,424	98	178	276	24%	524	45%	356	31%	1,156	1,975	19	34	53	± 5	68	± 6	44
2009	9,868	49	126	175	22%	393	49%	239	30%	807	1,351	12	32	45	± 5	61	± 6	42
2010	9,860	39	119	158	21%	349	47%	237	32%	744	850	11	34	45	± 5	68	± 7	47
2011	5,761	26	94	120	22%	257	47%	166	31%	543	1,276	10	37	47	± 6	65	± 8	44
2012	6,004	23	44	67	16%	198	48%	149	36%	414	0	12	22	34	± 6	75	± 10	56

**2013 HUNTING SEASONS
NORTH CONVERSE MULE DEER HERD (MD755)**

Hunt Area	Type	Dates of Seasons		Quota	Limitations
		Opens	Closes		
22	1	Oct. 1	Oct. 14	600	Limited quota licenses; antlered mule deer or any white-tailed deer
	6	Oct. 1	Oct. 14	100	Limited quota licenses; doe or fawn
Archery		Sep. 1	Sep. 30		Refer to license type and limitations in Section 3

Hunt Area	Type	Quota change from 2012
22	6	-100

Management Evaluation

Current Postseason Population Management Objective: 9,100

Management Strategy: Special

2012 Postseason Population Estimate: ~6,000

2013 Proposed Postseason Population Estimate: ~6,000

Herd Unit Issues

The North Converse Mule Deer herd has a postseason population objective of 9,100 mule deer and is managed under the special management strategy, with a goal of maintaining postseason buck ratios between 30-45 bucks per 100 does. The objective and management strategy were last revised in 1997.

Public hunting access within the herd unit is poor, with only small tracts of accessible public land interspersed with predominantly private lands. High trespass fees and outfitting for mule deer are common on most ranches within this herd unit. As a result, licenses remain undersubscribed in years when issuance is elevated to increase harvest on an over-objective population. Primary land uses in this area include extensive oil and gas production, large-scale industrial wind generation, In-situ uranium production, and traditional cattle and sheep grazing. In recent years, expansion of oil shale development has dramatically escalated anthropogenic disturbance throughout this herd unit.

Weather

Weather conditions throughout 2012 and into 2013 were extremely dry and warmer than normal. The winters of 2011-2012 and 2012-13 were mild and with little snow accumulation. As a result, over winter survival was likely high in bio-year 2011 and is presumed to again be good in bio-year 2012. Although the spring and summer of 2012 were extraordinarily dry, fawn productivity and over-summer survival was not impacted. However, both adults and fawns likely entered the 2012-2013 winter in extremely poor body condition.

Habitat

Although there are no habitat transects in this herd unit, current habitat conditions are generally poor due to the extreme drought realized in 2012. Anecdotal observations by personnel confirm this, as there was little to no herbaceous and sagebrush forage production. In addition to poor leader growth production in 2012, sagebrush communities are likely experiencing heavy browsing pressure given remaining pronghorn densities in conjunction with large-scale domestic sheep production.

Field Data

Fawn ratios have remained fairly consistent, with the 2012 ratio of 75 being higher than the preceding 5-year average of around 70. Postseason buck ratios declined to 34 in 2012, which was a marked decrease compared to the preceding 5 year average of 47. Regardless, the 2012 buck ratios remained within designated management strategy criteria.

It has been increasingly difficult to meet classification sample sizes in this herd unit as it is not a budget priority for aerial surveys. Total number of animals classified has steadily decreased since 2009. In 2012, the adequate sample size was 1,262 animals, yet only 414 mule deer were classified despite intensive ground coverage. This further corroborates the notion that this population has declined, as classification sample sizes have declined dramatically in recent years despite similar levels of effort.

Harvest

License success in this herd unit continues to remain very high, averaging 80% over the preceding 5 years. Success again remained high in 2012 (78%). In 2012, only 371 of 600 licenses were issued through the draw with the remaining 229 licenses being issued after the draw. The number of Type 1 licenses being leftover after the draw has been significantly higher in previous years when license issuance was higher. In 2012, 64% of hunters reported being either satisfied or very satisfied with their hunt. This level of satisfaction is remarkably high given the lack of public access in this herd unit coupled with the fact that many hunters purchase leftover Type 1 licenses without securing private land permission. Given the recent population decline, Type 1 license issuance was reduced from 1,000 in 2010 to 600 in 2012. Based on the continued high license success and observed postseason buck ratios within management criteria, Type 1 license issuance was appropriate in 2012 to meet both hunter and landowner expectations. Given the model predicts a stable population through 2013, buck harvest should remain static.

Population

The 2012 postseason population estimate was about 6,000 mule deer, which is an almost 20% reduction in this herd from the preceding 5-year average of ~9,300. This herd consistently remained above objective for several years (due to unsold licenses and a lack of public access) until substantial winter mortality occurred in bio-year 2010. This herd has since declined and is now 34% below objective.

The “Semi Constant Juvenile – Semi Constant Adult Mortality Rate” (SCJ-SCA) spreadsheet model was chosen for the post-season population estimate of this herd. This model essentially had the lowest relative AIC (46) and most accurately depicted population trend based on field personnel perceptions and extensive landowner input. Survival rates were adjusted downward in bio-year 2010 as significant winter mortality was known to occur. This model is considered to be of medium quality based on model fit, although managers strongly concur with simulated population trend. Regardless, given consistently inadequate classification sample sizes, observed buck ratios may not be accurate and therefore should not be used as a primary basis for assessing model quality.

Management Summary

The hunting season in this area has traditionally run from October 1st to October 14th. These season dates have generally been adequate to meet landowner desires while allowing a reasonable harvest. For 2013, the Department retained Type 1 license issuance but instituted a limitation, restricting harvest to only antlered mule deer or any white-tailed deer. In addition, the Type 6 quota was reduced by 100 licenses to further reduce female harvest given the population is estimated to be 34% below objective. Some Type 6 licenses were retained to provide opportunity in some areas where localized high densities warrant female harvest.

If we attain the projected harvest of 430 individuals and experience normal fawn productivity, the predicted 2013 postseason population will likely remain stable at approximately 6,000 mule deer.

INPUT	
Species:	Mule Deer
Biologist:	Erika Peckham
Herd Unit & No.:	North Converse (MD755)
Model date:	02/22/13

☒ Clear form

MODELS SUMMARY				Check best model to create report	Notes
CJ,CA	Constant Juvenile & Adult Survival	Fit	Relative AICc	<input type="checkbox"/> CJ,CA Model <input checked="" type="checkbox"/> SCJ,SCA IV <input type="checkbox"/> TSJ,CA Model	
SCJ,SCA	Semi-Constant Juvenile & Semi-Constant Adult Survival	36	45		
TSJ,CA	Time-Specific Juvenile & Constant Adult Survival	31	46		
		4	111		

Population Estimates from Top Model									
Year	Posthunt Population Est. Field Est	Trend Count	Predicted Prehunt Population		Predicted Posthunt Population		Total	Objective	
			Juveniles	Total	Juveniles	Total			
1993			2420	9592	2409	8733	9100		
1994			3093	9851	3063	8887	9100		
1995			3316	9963	3291	9151	9100		
1996			3941	10733	3931	10020	9100		
1997			3408	10722	3349	9828	9100		
1998			4386	11751	4331	10847	9100		
1999			4150	12039	4129	11069	9100		
2000			3293	11453	3265	10466	9100		
2001			2973	10929	2957	10071	9100		
2002			2601	10326	2581	9514	9100		
2003			2969	10347	2948	9594	9100		
2004			3233	10544	3224	9741	9100		
2005			3778	11113	3762	10289	9100		
2006			3033	10647	3026	9745	9100		
2007			4141	11555	4126	10779	9100		
2008			3354	11261	3336	10424	9100		
2009			2954	10847	2933	9868	9100		
2010			3205	10762	3160	9860	9100		
2011			1867	6481	1798	5761	9100		
2012			2119	6498	2097	6004	9100		
2013			2013	6493	1991	6020	9100		
2014							9100		
2015							9100		
2016							9100		
2017							9100		
2018							9100		
2019							9100		
2020							9100		
2021							9100		
2022							9100		
2023							9100		
2024							9100		
2025							9100		

Survival and Initial Population Estimates

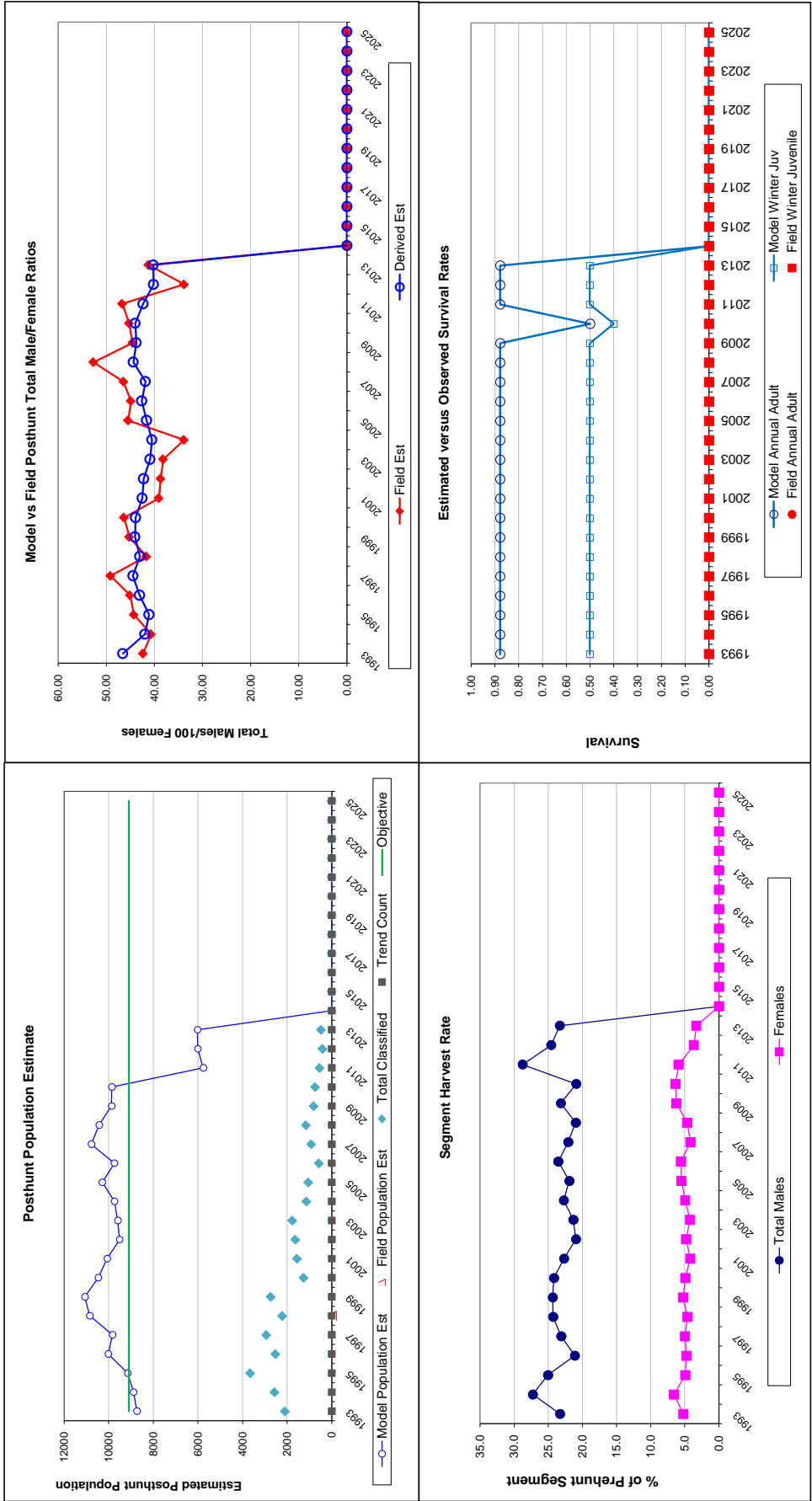
Year	Annual Juvenile Survival Rates		Annual Adult Survival Rates	
	Model Est	Field Est SE	Model Est	Field Est SE
1993	0.50		0.88	
1994	0.50		0.88	
1995	0.50		0.88	
1996	0.50		0.88	
1997	0.50		0.88	
1998	0.50		0.88	
1999	0.50		0.88	
2000	0.50		0.88	
2001	0.50		0.88	
2002	0.50		0.88	
2003	0.50		0.88	
2004	0.50		0.88	
2005	0.50		0.88	
2006	0.50		0.88	
2007	0.50		0.88	
2008	0.50		0.88	
2009	0.50		0.88	
2010	0.40		0.50	
2011	0.50		0.88	
2012	0.50		0.88	
2013	0.50		0.88	
2014				
2015				
2016				
2017				
2018				
2019				
2020				
2021				
2022				
2023				
2024				
2025				

Parameters:		Optim cells
Juvenile Survival =		0.501
Adult Survival =		0.878
Initial Total Male Pop/10,000 =		0.201
Initial Female Pop/10,000 =		0.432

MODEL ASSUMPTIONS	
Sex Ratio (% Males) =	50%
Wounding Loss (total males) =	10%
Wounding Loss (females) =	10%
Wounding Loss (juveniles) =	10%

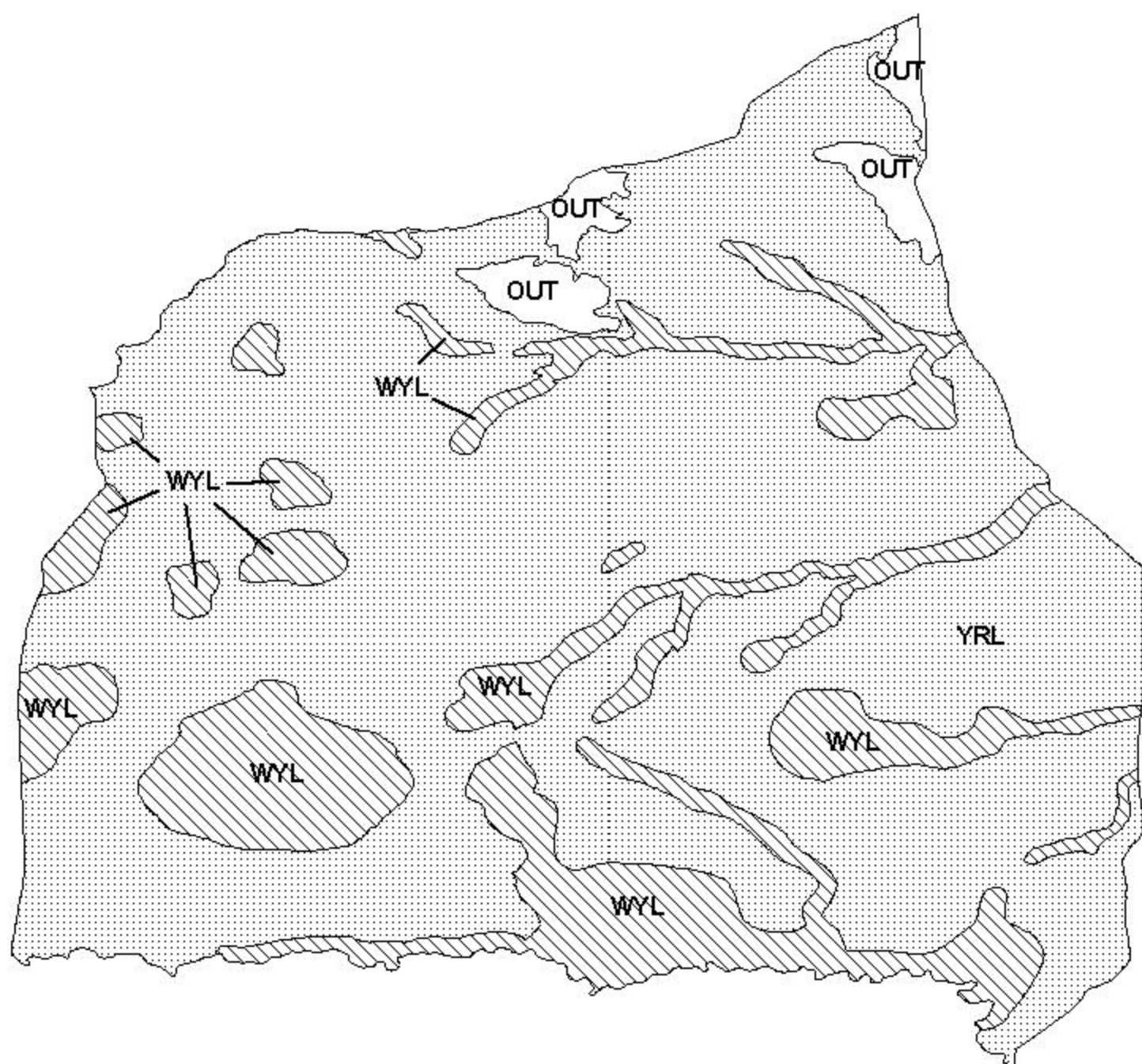
Classification Counts										Harvest	
Year	Juvenile/Female Ratio			Total Male/Female Ratio			Juv			Segment Harvest Rate (% of Total Males	
	Derived Est	Field Est	Field SE	Derived Est	Field Est w/o bull adj	Field SE	Juv	Males	Females	Total Harvest	Females
1993	55.82	2.87		46.57	42.38	2.39	10	555	216	781	23.3
1994	74.68	3.31		41.97	40.71	2.19	27	587	263	877	27.3
1995	79.27	2.95		41.13	44.28	1.98	23	519	196	738	25.1
1996	92.38	4.09		43.07	45.06	2.48	9	446	194	649	21.1
1997	74.68	3.15		44.47	49.12	2.36	54	545	214	813	23.1
1998	95.09	4.45		43.03	41.67	2.51	50	572	200	822	24.3
1999	85.71	3.67		44.06	45.22	2.36	19	621	242	882	24.3
2000	65.27	4.25		43.91	46.31	3.37	25	637	236	898	24.2
2001	59.26	3.47		42.54	39.08	2.63	14	567	199	780	22.7
2002	52.94	3.09		42.23	38.71	2.51	18	496	224	738	21.0
2003	62.50	3.40		40.92	38.18	2.45	19	476	190	685	21.3
2004	69.53	4.60		40.52	33.87	2.85	8	503	219	730	22.7
2005	81.60	5.66		41.61	45.45	3.78	15	490	244	749	21.9
2006	64.23	6.20		42.62	44.89	4.87	6	562	252	820	23.5
2007	88.01	6.50		41.89	46.43	4.16	13	506	186	705	22.1
2008	67.94	4.67		44.39	52.67	3.92	17	526	218	761	21.0
2009	60.81	4.99		43.77	44.53	4.05	19	579	292	890	23.2
2010	67.91	5.72		43.99	45.27	4.34	41	492	287	820	20.9
2011	64.59	6.43		42.36	46.69	5.16	63	433	159	655	28.8
2012	75.25	8.16		40.20	33.84	4.78	20	332	97	449	24.6
2013	69.30	7.17		40.27	41.23	5.05	20	320	90	430	23.3
2014											
2015											
2016											
2017											
2018											
2019											
2020											
2021											
2022											
2023											
2024											
2025											

FIGURES



Comments:

END



Mule Deer (MD755) - North Converse
HA 22
Revised - 98



2012 - JCR Evaluation Form

SPECIES: Mule Deer

PERIOD: 6/1/2012 - 5/31/2013

HERD: MD756 - SOUTH CONVERSE

HUNT AREAS: 65

PREPARED BY: HEATHER
O'BRIEN

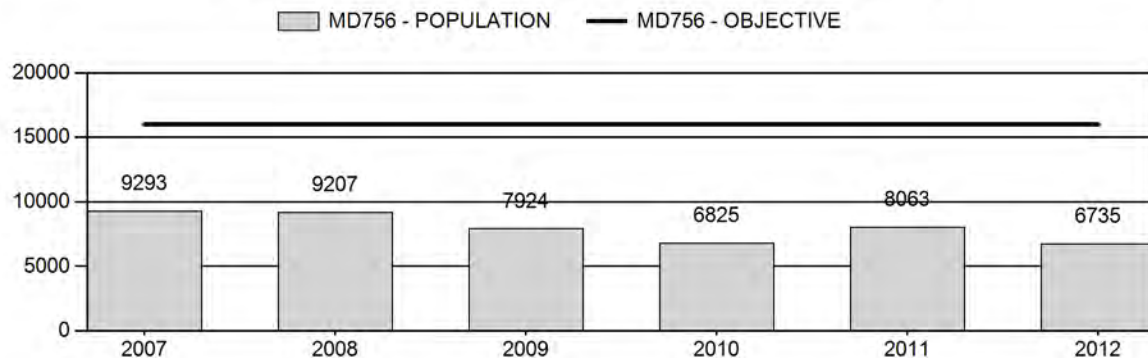
	<u>2007 - 2011 Average</u>	<u>2012</u>	<u>2013 Proposed</u>
Population:	8,262	6,735	6,602
Harvest:	506	357	315
Hunters:	1,086	861	850
Hunter Success:	47%	41%	37%
Active Licenses:	1,116	861	850
Active License Percent:	45%	41%	37%
Recreation Days:	4,353	2,931	3,100
Days Per Animal:	8.6	8.2	9.8
Males per 100 Females	39	36	
Juveniles per 100 Females	52	46	

Population Objective: 16,000
 Management Strategy: Recreational
 Percent population is above (+) or below (-) objective: -57.9%
 Number of years population has been + or - objective in recent trend: 12
 Model Date: 5/7/2013

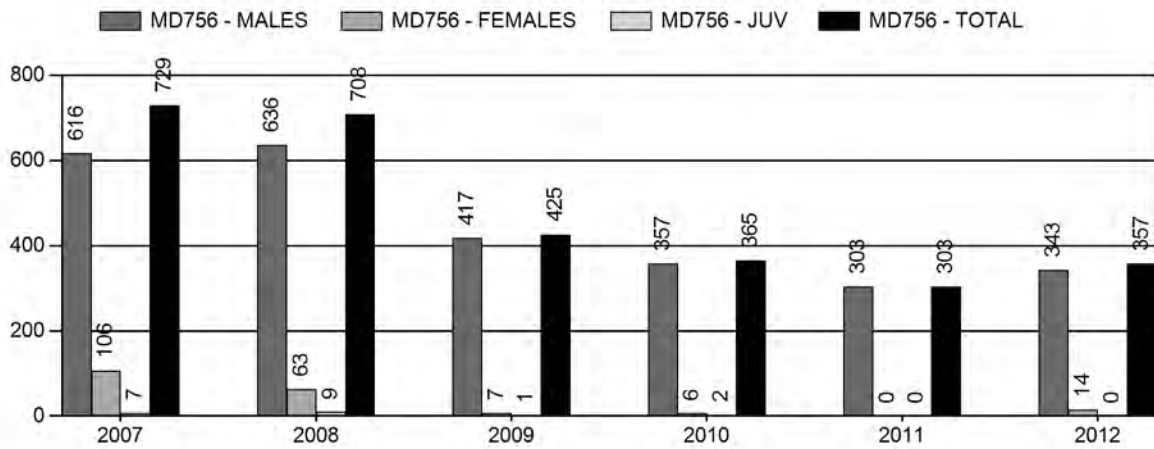
Proposed harvest rates (percent of pre-season estimate for each sex/age group):

	<u>JCR Year</u>	<u>Proposed</u>
Females \geq 1 year old:	0%	0%
Males \geq 1 year old:	21.9%	20.5%
Juveniles (< 1 year old):	0%	0%
Total:	5.56%	4.53%
Proposed change in post-season population:	-5.5%	-4.9%

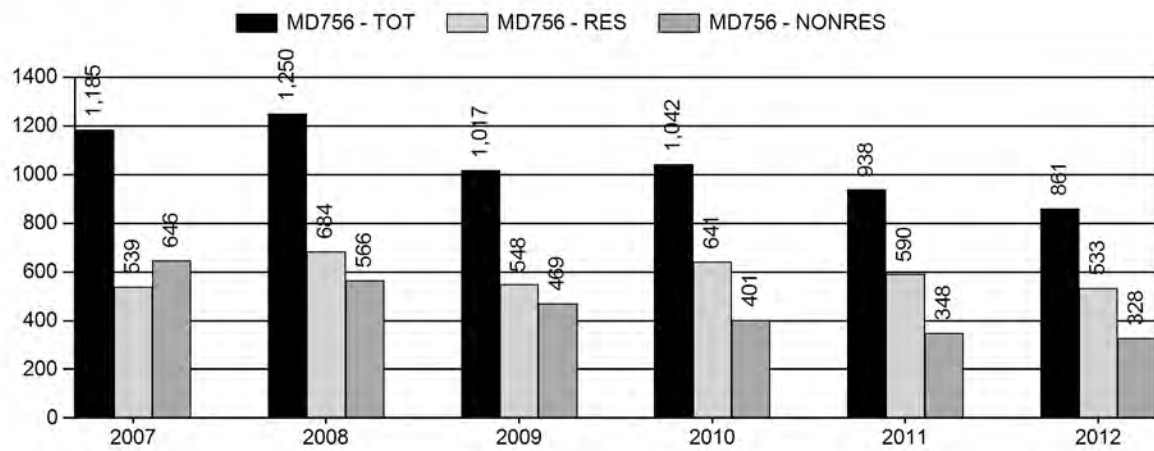
Population Size - Postseason



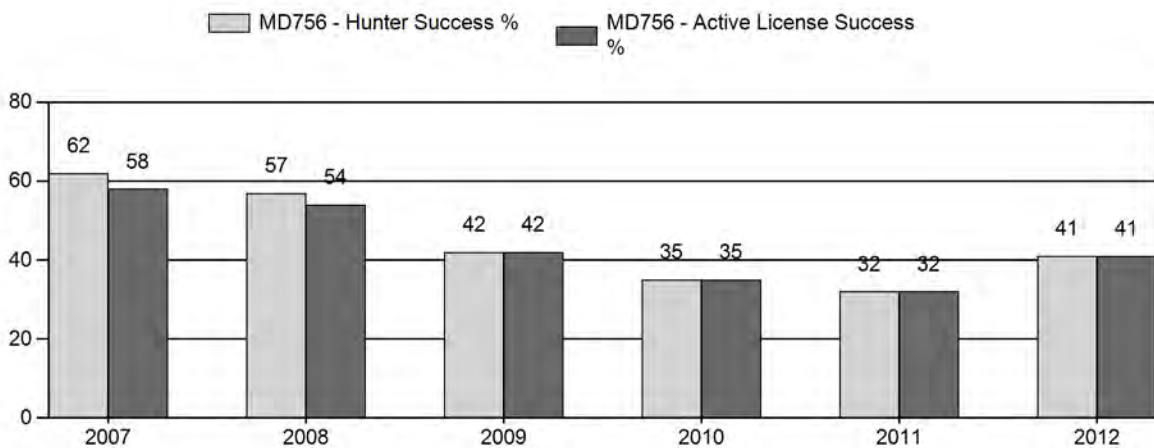
Harvest



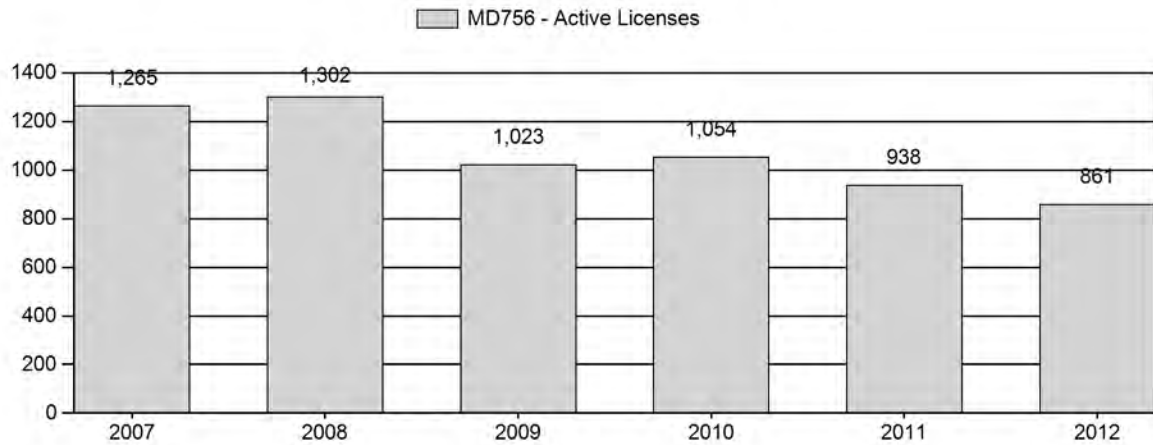
Number of Hunters



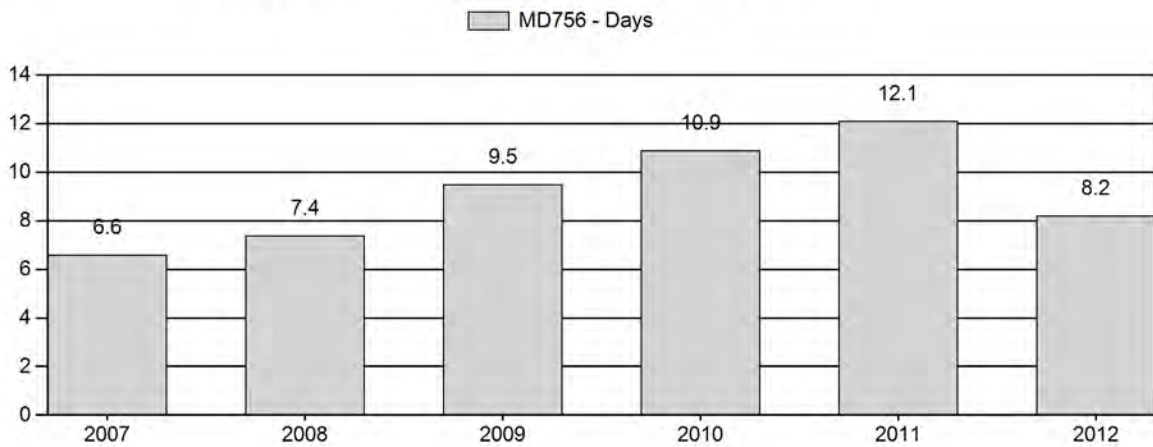
Harvest Success



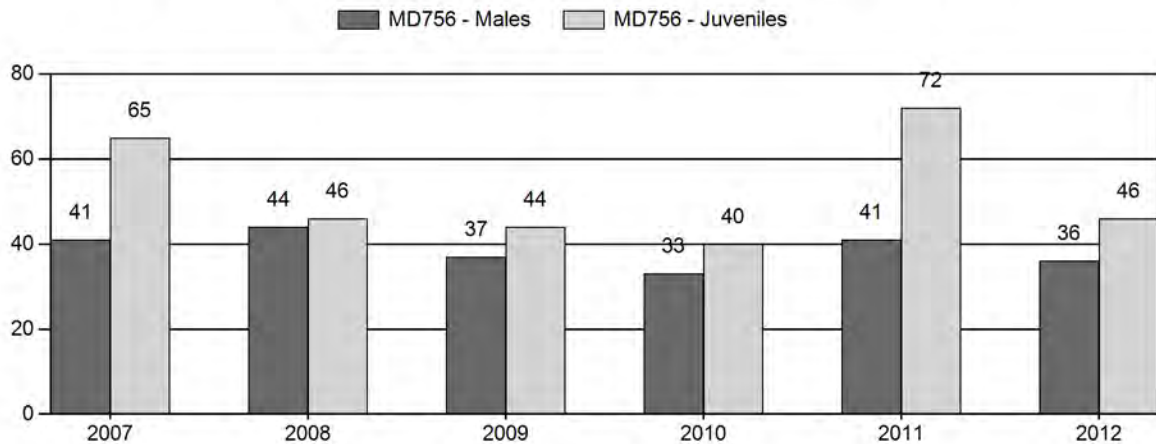
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2007 - 2012 Postseason Classification Summary

for Mule Deer Herd MD756 - SOUTH CONVERSE

Year	Post Pop	MALES				FEMALES		JUVENILES		Tot Cls	Cls Obj	Males to 100 Females				Young to		
		Ylg	Adult	Total	%	Total	%	Total	%			Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2007	9,307	42	111	153	20%	376	49%	243	31%	772	1,280	11	30	41	± 5	65	± 7	46
2008	9,218	63	183	246	23%	558	53%	256	24%	1,060	776	11	33	44	± 4	46	± 4	32
2009	9,868	57	149	206	20%	557	55%	243	24%	1,006	696	10	27	37	± 4	44	± 4	32
2010	6,837	84	154	238	19%	720	58%	287	23%	1,245	585	12	21	33	± 3	40	± 3	30
2011	8,080	83	167	250	19%	612	47%	441	34%	1,303	778	14	27	41	± 4	72	± 5	51
2012	6,771	89	163	252	20%	693	55%	318	25%	1,263	720	13	24	36	± 3	46	± 4	34

2013 HUNTING SEASONS
SOUTH CONVERSE MULE DEER (MD756)

Hunt Area	Type	Date of Seasons		Quota	Limitations
		Opens	Closes		
65		Oct. 15	Oct. 21		General license; antlered mule deer or any white-tailed deer
Archery		Sept. 1	Sept. 30		Refer to license types and limitations in Section 3

Region J Nonresident Quota: 1,100

Management Evaluation

Current Postseason Population Management Objective: 16,000

Management Strategy: Recreational

2012 Postseason Population Estimate: 6,700

2013 Proposed Postseason Population Estimate: 6,600

The South Converse Mule Deer Herd Unit has a postseason population management objective of 16,000 deer. The herd is managed using the recreational management strategy, with a goal of maintaining postseason buck ratios between 20-29 bucks per 100 does. The objective and management strategy were last revised in 1989, and will be formally reviewed in 2013.

Herd Unit Issues

Hunting access within the herd unit is marginal, with tracts of public land and national forest interspersed with predominantly private lands. Walk-in and hunter management areas have provided additional hunting opportunity in several places within the herd unit. The main land use is traditional ranching and grazing of livestock, with agricultural fields that have the potential for damage issues when big game are abundant. Doe/fawn licenses have historically been issued to address damage, but are not currently necessary for mule deer. Disease issues are a concern within this herd unit in particular, as the prevalence of Chronic Wasting Disease (CWD) is higher here than any other area in Wyoming or adjacent states. Research investigating population-level effects of CWD is currently in its fourth and final year within the herd unit. Please refer to Appendix A of this report for further information regarding CWD and ongoing research in the South Converse Herd Unit.

Weather

The winter of 2011-2012 was mild with below average snow accumulations and relatively warm temperatures. The growing season of 2012 through early winter of 2013 was extremely dry with above average temperatures. During the same time period, forage growth, forage quality, and available water were below average. As a result, very poor fawn ratios of 49:100 were observed during 2012 postseason classification surveys. The continued lack of quality forage in the winter of 2012-2013 could result in increased mule deer mortality in the spring of 2013, particularly if current late snow accumulations create an additional stressor.

Habitat

This herd unit has several established habitat transects that measure production and utilization on True Mountain Mahogany (*Cercocarpus montanus*); however no data were collected in 2012. Comparable transects measured in 2012 in the adjacent Bates Hole Mule Deer Herd Unit showed the worst production since 2004 on Mountain Mahogany, and the worst production since 2002 on Big Sagebrush (*Artemisia tridentata*). It is thus presumed that poor shrub and herbaceous plant production were prevalent as a result of the 2012 summer drought. Lactating does and fawns in particular are likely to have suffered diminished nutrition during the last growing season. Winter utilization data were not collected in 2011-12.

Field Data

Fawn ratios were moderate in this herd from 2000-2007, and the population fluctuated between approximately 8,000 and 12,000 deer during this time period. The general license season during this time period was 11 days, and issuance of doe/fawn licenses ranged from 50 to 400 licenses. A more liberal season was instituted in 2008, lengthening the season to 17 days and offering 200 doe/fawn licenses. From 2008-2012, fawn ratios were poor (40s per 100 does), with the exception of 2011 when the fawn ratio spiked to 72 fawns per 100 does. The population has gradually declined since 2008 from approximately 8,000 to 6,000 deer. In accordance, the general license season was shortened to 7 days. Doe/fawn licenses were diminished and subsequently eliminated from the 2011 and 2012 hunting seasons.

Buck ratios within the South Converse Herd historically average in the 30s-40s per 100 does, exceeding the upper limit for recreational management. These ratios seem counterintuitive, as current CWD research references higher prevalence in males than females (Farnsworth et al, 2005). Higher buck ratios in this unit are likely a function of limited access to hunting on private lands, where a minimal level of harvest pressure on bucks is typical.

Harvest Data

Hunter success in this herd averaged between 50 and 60 percent from 1998-2008. Harvest success has been lower in recent years (32-42%) with declines in deer numbers, and was 40% in 2012. Hunter days per animal generally climbed from 1998 to 2011 from 5.1 to 12.1 days. Days per animal improved slightly in 2012, which is likely due in part to the previous year's higher fawn production. Harvest success and hunter days are not expected to improve in this herd unit until fawn production improves and enhances the growth rate of this population over consecutive years.

Population

The 2012 postseason population estimate was approximately 6,800 and trending slightly downward from an estimated high of 15,800 deer in 1998. To date there have been no sightability surveys conducted in the herd unit, though one may be conducted in 2013-2014 if funding is secured. A sightability survey would provide an anchor point and improve the accuracy of the model.

The "Time-Specific Juvenile Survival – Constant Adult Survival" (TSJ,CA) spreadsheet model was chosen for the postseason population estimate of this herd. This model seemed the most representative of the herd, as it selects for higher juvenile survival during years when field personnel observed more favorable environmental and habitat conditions. The simpler models (CJ,CA and SCJ,CA) select for a very low juvenile survival rate, which does not seem feasible for this herd. All three models follow a trend that seems representative for the herd unit. However, the CJ,CA and SCJ,CA models estimate a larger population overall which do not seem realistic compared to historic and current perceptions of field personnel. While the TSJ,CA model has the highest AIC, it is still within one order of magnitude of the other model AICs. The model is considered to be of good quality. Survival rates are currently being collected in this herd as part of a graduate research project, and will be incorporated into the model when they become available.

Management Summary

Opening day for hunting the South Converse Mule Deer Herd Unit has traditionally been October 15th, with closing dates that have changed to offer greater or lesser opportunity depending on the management direction desired. In recent years, general licenses have been valid for antlered mule deer only. Doe/fawn licenses are offered in years the herd is above management objective, or in cases where agricultural damage is an issue. The 2013 hunting season will consist of a short, seven-day season with no doe/fawn licenses, as the population is at

an almost historic low. Until habitat conditions and weather allow for higher fawn production, this population will likely remain low and seasons will remain conservative.

If we attain the projected harvest of 315 bucks and fawn ratios remain poor, this herd will likely remain stable but low. The predicted 2013 postseason population size of the South Converse Herd is approximately 6,600 mule deer.

Citations

Farnsworth, M.L., L.L. Wolfe, N.T. Hobbs, K.P. Burnham, E.S. Williams, D.M. Theobald, M.M. Conner, & M.W. Miller. Human Land Use Influences Chronic Wasting Disease Prevalence in Mule Deer. *Ecological Applications*, 15(1): 119-126.

INPUT	
Species:	Deer
Biologist:	Heather O'Brien
Herd Unit & No.:	South Converse
Model date:	06/30/12

☐ Clear form

MODELS SUMMARY					Check best model to create report		Notes
					Relative AICc	Fit	
CJ,CA	Constant Juvenile & Adult Survival				98	89	
SCJ,SCA	Semi-Constant Juvenile & Semi-Constant Adult Survival				63	46	
TSJ,CA	Time-Specific Juvenile & Constant Adult Survival				127	8	

Population Estimates from Top Model											
Year	Posthunt Population Est.		Trend Count		Predicted Prehunt Population			Predicted Posthunt Population			Objective
	Field Est	Field SE			Juveniles	Total Males	Females	Juveniles	Total Males	Females	Total
1993					3223	2474	7425	3192	1167	6793	11152
1994					3000	1575	6091	2993	914	5821	9728
1995					3663	1509	5447	3663	921	5447	10032
1996					5037	2388	6020	5037	1758	6020	12815
1997					5367	2596	6017	5367	1797	6017	13182
1998					7423	2516	5903	7423	1807	5903	15132
1999					5812	2934	6222	5797	1904	6053	13754
2000					4189	2839	6169	4172	1960	5903	12035
2001					2670	2850	5814	2647	1930	5583	10160
2002					2700	2079	5010	2659	1466	4756	8881
2003					2491	1708	4349	2456	1219	4068	7742
2004					2919	2083	4370	2914	1530	4342	8786
2005					2940	2293	4550	2938	1830	4508	9276
2006					2452	2314	4464	2450	1748	4422	8619
2007					2938	2505	4651	2931	1827	4535	9293
2008					2251	2781	4954	2241	2082	4885	9207
2009					1904	2119	4369	1903	1680	4361	7824
2010					1561	1749	3917	1559	1356	3910	6825
2011					2767	1790	3840	2767	1457	3840	8063
2012					1771	1722	3635	1771	1345	3620	6735
2013					1748	1688	3513	1748	1341	3513	6602
2014											16000
2015											16000
2016											16000
2017											16000
2018											16000
2019											16000
2020											16000
2021											16000
2022											16000
2023											16000
2024											16000
2025											16000

Survival and Initial Population Estimates

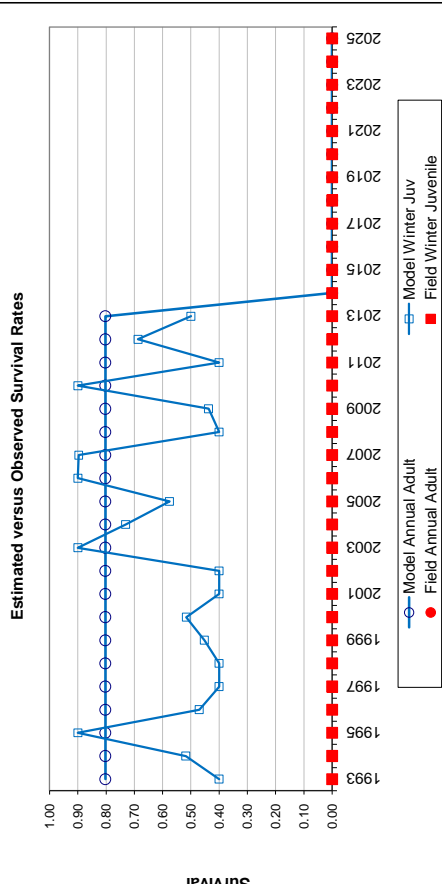
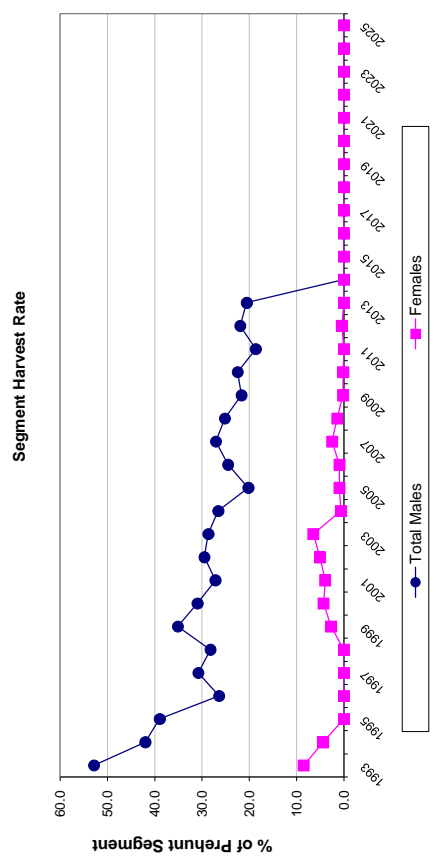
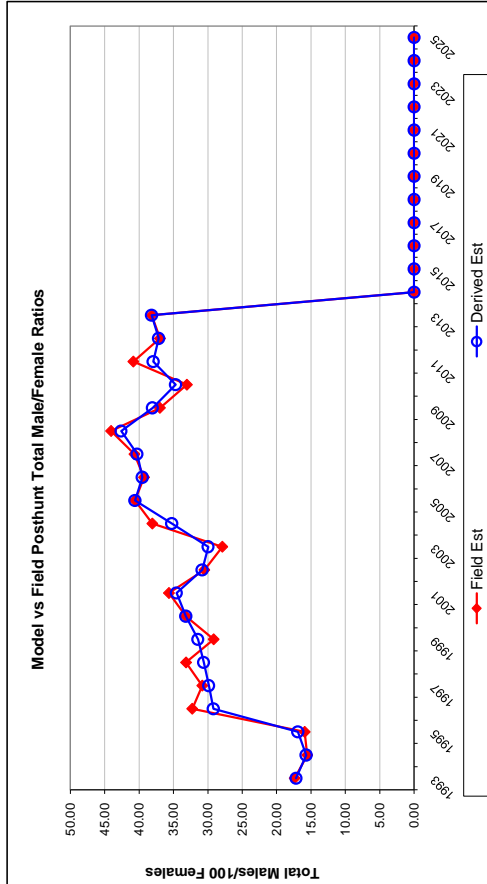
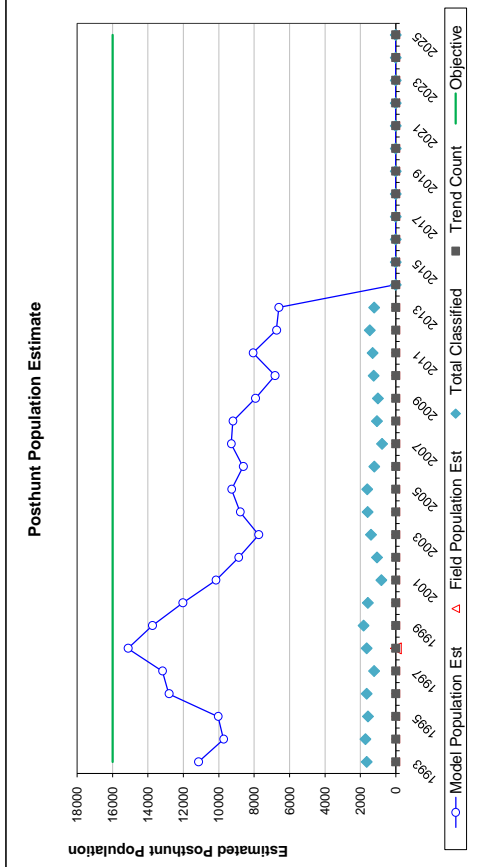
Year	Annual Juvenile Survival Rates		Annual Adult Survival Rates	
	Model Est	Field Est	Model Est	Field Est
1993	0.40		0.80	
1994	0.52		0.80	
1995	0.90		0.80	
1996	0.47		0.80	
1997	0.40		0.80	
1998	0.40		0.80	
1999	0.45		0.80	
2000	0.52		0.80	
2001	0.40		0.80	
2002	0.40		0.80	
2003	0.90		0.80	
2004	0.73		0.80	
2005	0.58		0.80	
2006	0.90		0.80	
2007	0.90		0.80	
2008	0.40		0.80	
2009	0.44		0.80	
2010	0.90		0.80	
2011	0.40		0.80	
2012	0.69		0.80	
2013	0.50		0.80	
2014				
2015				
2016				
2017				
2018				
2019				
2020				
2021				
2022				
2023				
2024				
2025				

Parameters:		Optim cells
Adult Survival =		0.803
Initial Total Male Pop/10,000 =		0.117
Initial Female Pop/10,000 =		0.679

MODEL ASSUMPTIONS	
Sex Ratio (% Males) =	50%
Wounding Loss (total males) =	10%
Wounding Loss (females) =	10%
Wounding Loss (juveniles) =	10%

Classification Counts										Harvest		
Year	Juvenile/Female Ratio			Total Male/Female Ratio			Juv	Males	Females	Total Harvest	Segment Harvest Rate (% of	
	Derived Est	Field Est	Field SE	Derived Est	Field Est w/o bull adj	Field SE					Total Males	Females
1993		46.99	2.63	17.18	17.37	1.43	28	1188	574	1790	52.8	8.5
1994		51.42	2.76	15.70	15.54	1.32	6	601	245	852	42.0	4.4
1995		67.25	3.63	16.91	15.91	1.47	0	534	0	534	38.9	0.0
1996		83.66	4.50	29.20	32.28	2.37	0	573	0	573	26.4	0.0
1997		89.19	5.51	29.87	30.81	2.69	0	726	0	726	30.8	0.0
1998		125.75	6.70	30.60	33.18	2.64	0	645	0	645	28.2	0.0
1999		95.78	4.82	31.45	29.16	2.16	13	937	154	1104	35.1	2.7
2000		70.69	3.96	33.20	33.20	2.40	15	799	242	1056	31.0	4.3
2001		47.40	3.97	34.58	35.67	3.30	21	654	210	885	27.1	4.0
2002		55.91	3.92	30.82	30.51	2.65	37	557	231	825	29.5	5.1
2003		60.38	3.61	29.97	27.90	2.19	32	445	256	733	28.7	6.5
2004		67.10	3.81	35.24	38.08	2.61	5	503	25	533	26.6	0.6
2005		65.17	3.71	40.59	40.59	2.70	2	421	38	461	20.2	0.9
2006		55.39	3.72	39.52	39.29	2.97	2	515	38	555	24.5	0.9
2007		64.63	5.32	40.30	40.69	3.90	7	616	106	729	27.0	2.5
2008		45.88	3.46	42.61	44.09	3.37	9	636	63	708	25.2	1.4
2009		43.63	3.35	38.07	36.98	3.02	1	417	7	425	21.6	0.2
2010		39.86	2.78	34.69	33.06	2.47	2	357	6	365	22.5	0.2
2011		72.06	4.50	37.94	40.85	3.07	0	303	0	303	18.6	0.0
2012		48.92	3.04	37.16	36.98	2.54	0	343	14	357	21.9	0.4
2013		49.77	3.39	38.17	38.18	2.86	0	315	0	315	20.5	0.0
2014												
2015												
2016												
2017												
2018												
2019												
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2021												
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2023												
2024												
2025												

FIGURES



Comments:

END

APPENDIX A

Chronic Wasting Disease in the South Converse Mule Deer Herd Unit: Prevalence and Management Concerns

The South Converse Mule Deer Herd Unit (Wyoming Hunt Area 65) has the highest prevalence of Chronic Wasting Disease (CWD) in Wyoming. High prevalence of CWD in mule deer is of particular concern to local wildlife managers, as mule deer herds statewide have declined due to a number of environmental factors. Managers are concerned that CWD may be an additive factor influencing mortality rates in the South Converse Herd, as it may be degrading the health of breeding-age females, suppressing conception rates, and affecting health and survivorship of neonates. Additionally, CWD may be adversely affecting deer survival due to behavioral changes - rendering infected deer more vulnerable to natural causes of mortality such as predation or exposure.

Hunter-harvested deer have been tested in this herd unit since 2001. It should be noted that hunter-harvested samples do not represent a random sample of this population. Rather, samples are biased towards younger age-class males, as hunting seasons have focused on antlered deer, and hunters who harvest larger mature bucks often decline sampling. Thus, prevalence in hunter-harvested deer may not be representative of the herd as a whole, but trends are likely to be similar.

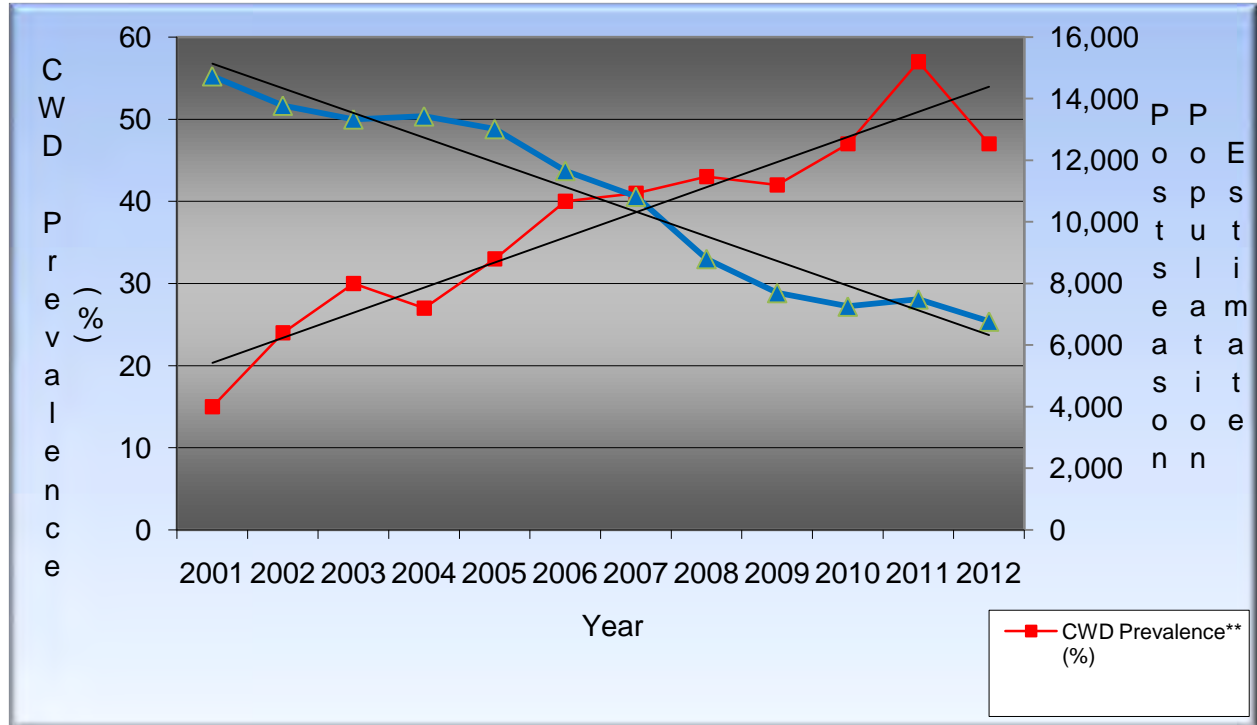
Since 2001, prevalence of CWD in hunter-harvested mule deer has increased significantly in the South Converse Mule Deer Herd, while the population has concurrently decreased (Table 1, Figure 1). Considering CWD is ultimately fatal in cervids, higher prevalence is suspected of having more adverse and perhaps additive impacts at the population level - either directly or indirectly. However, it is difficult to discern or quantify the impacts of CWD on this population without further study.

A collaborative research project was initiated in 2010 to investigate the effects of CWD on the South Converse Mule Deer Herd. Using GPS-collared deer, a number of variables have been explored to better understand the relationship between CWD and the dynamics of the population. This research is a cooperative effort of the United States Geological Survey, the University of Wyoming, and the Wyoming Game and Fish Department, and is in its fourth and final field season. Results should become available and published as analysis is completed.

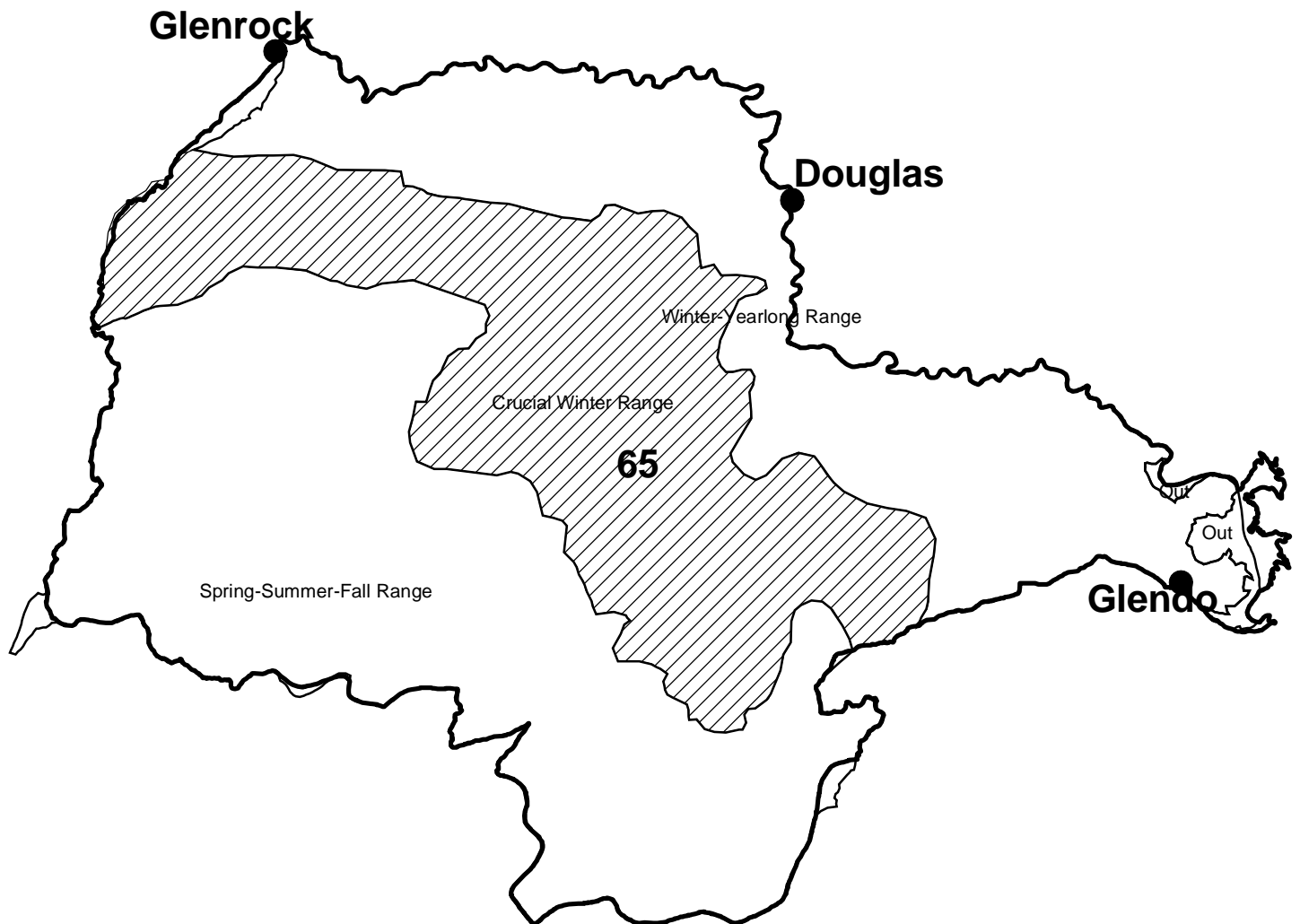
Table 1. CWD surveillance in hunter-harvested mule deer in the South Converse Herd Unit, 2001-2012.

Year	Total Harvest	N Tested	N Positive	CWD Prevalence
2001	885	81	12	15%
2002	825	98	23	24%
2003	733	155	46	30%
2004	533	52	14	27%
2005	461	88	29	33%
2006	555	81	32	40%
2007	729	74	30	41%
2008	708	44	19	43%
2009	425	48	20	42%
2010	365	42	20	47%
2011	303	35	20	57%
2012	345	30	14	47%

Figure 1. CWD prevalence of hunter-harvested mule deer and postseason population estimates for the South Converse Mule Deer Herd Unit, 2001-2012.



Mule Deer - South Converse
Hunt Area 65
Casper Region
Revised 3/94



2012 - JCR Evaluation Form

SPECIES: Mule Deer

PERIOD: 6/1/2012 - 5/31/2013

HERD: MD757 - BATES HOLE/HAT SIX

HUNT AREAS: 66-67

PREPARED BY: HEATHER
O'BRIEN

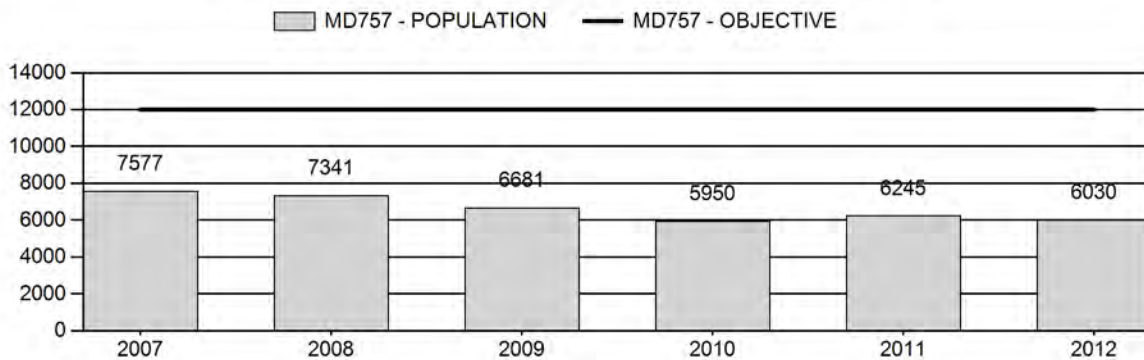
	<u>2007 - 2011 Average</u>	<u>2012</u>	<u>2013 Proposed</u>
Population:	6,759	6,030	5,865
Harvest:	472	241	205
Hunters:	1,082	757	700
Hunter Success:	44%	32%	29%
Active Licenses:	1,097	757	700
Active License Percent:	43%	32%	29%
Recreation Days:	3,964	2,431	2,700
Days Per Animal:	8.4	10.1	13.2
Males per 100 Females	25	17	
Juveniles per 100 Females	57	61	

Population Objective:	12,000
Management Strategy:	Recreational
Percent population is above (+) or below (-) objective:	-49.8%
Number of years population has been + or - objective in recent trend:	19
Model Date:	5/7/2013

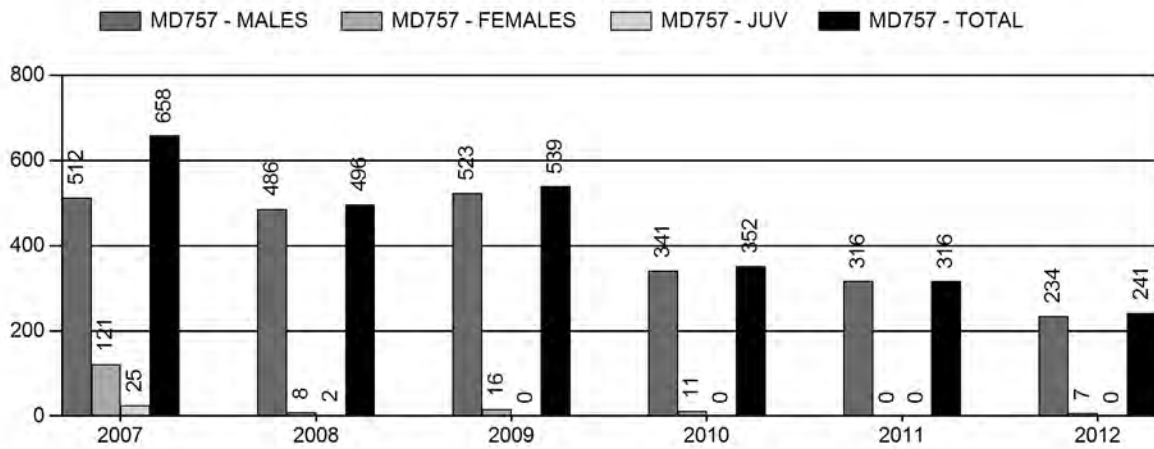
Proposed harvest rates (percent of pre-season estimate for each sex/age group):

	<u>JCR Year</u>	<u>Proposed</u>
Females \geq 1 year old:	0.2%	0.2%
Males \geq 1 year old:	26.7%	22%
Juveniles (< 1 year old):	0%	0%
Total:	7.2%	6.4%
Proposed change in post-season population:	-3.4%	-2.7%

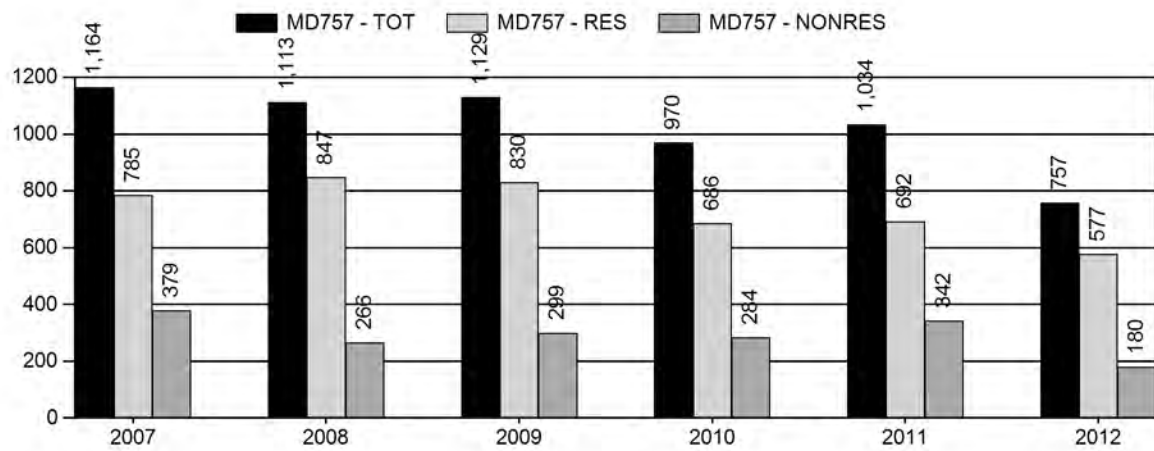
Population Size - Postseason



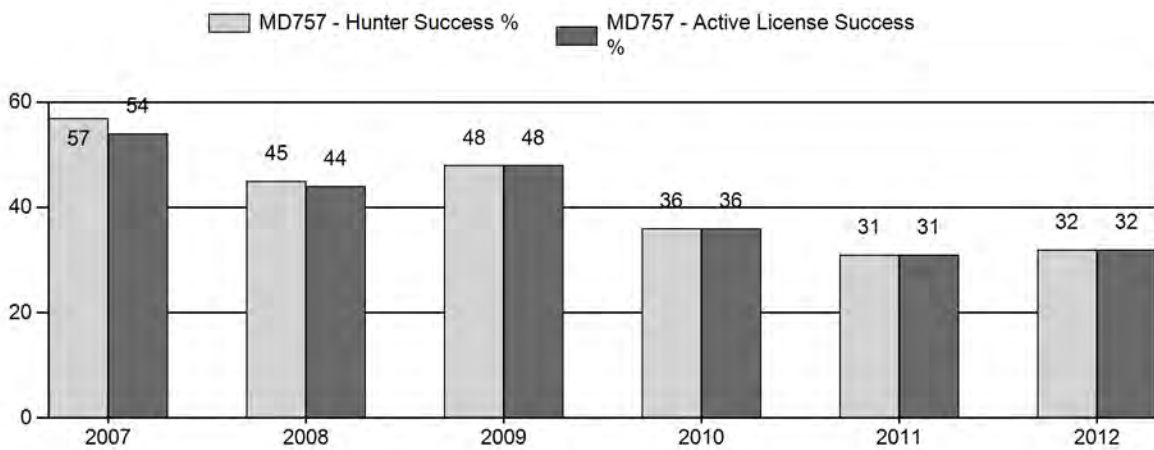
Harvest



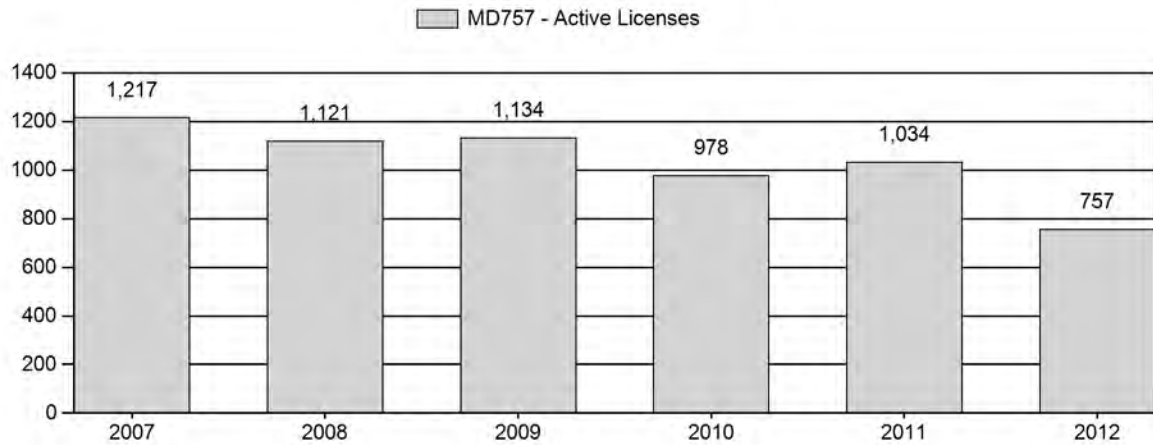
Number of Hunters



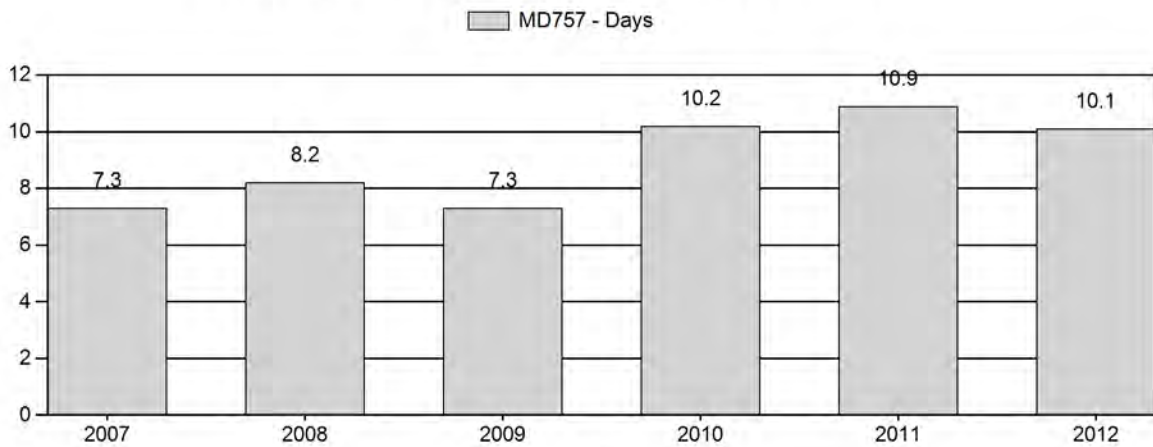
Harvest Success



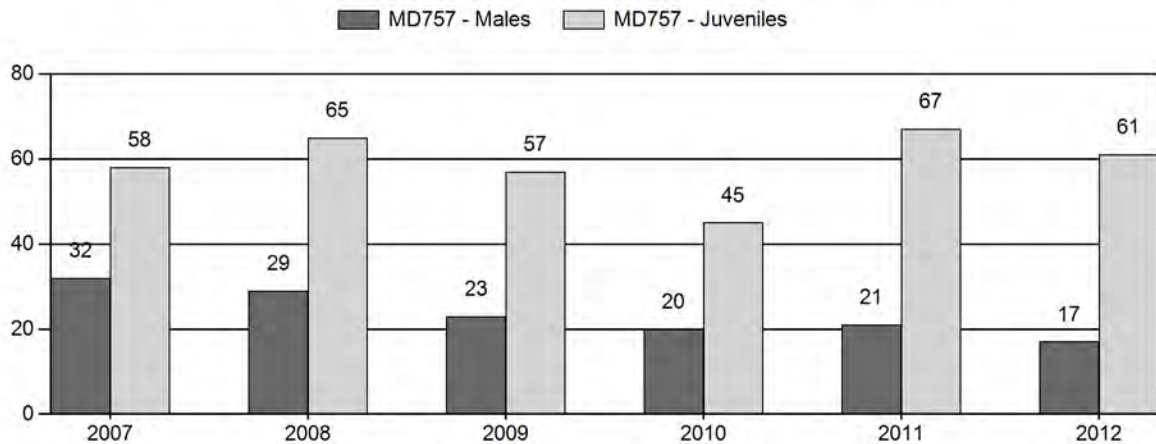
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2007 - 2012 Postseason Classification Summary

for Mule Deer Herd MD757 - BATES HOLE/HAT SIX

Year	Post Pop	MALES				FEMALES		JUVENILES		Tot Cls	Cls Obj	Males to 100 Females				Young to		
		Ylg	Adult	Total	%	Total	%	Total	%			Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2007	7,582	99	156	255	17%	804	53%	466	31%	1,525	1,005	12	19	32	± 3	58	± 4	44
2008	7,347	75	114	189	15%	647	52%	418	33%	1,254	1,166	12	18	29	± 3	65	± 5	50
2009	6,687	59	112	171	13%	730	55%	419	32%	1,320	934	8	15	23	± 2	57	± 4	47
2010	5,956	82	100	182	12%	894	60%	403	27%	1,479	642	9	11	20	± 2	45	± 3	37
2011	6,252	47	93	140	11%	666	53%	443	35%	1,249	698	7	14	21	± 2	67	± 5	55
2012	6,034	27	90	117	10%	689	56%	418	34%	1,224	650	4	13	17	± 2	61	± 4	52

**2013 HUNTING SEASONS
BATES HOLE / HAT SIX MULE DEER (MD757)**

Hunt Area	Type	Date of Seasons		Quota	Limitations
		Opens	Closes		
66		Oct. 15	Oct. 21		General license; antlered mule deer three (3) points or more on either antler or any white-tailed deer
67					CLOSED
Archery		Sept. 1	Sept. 30		Refer to license type and limitations in Section 3.

Region D Nonresident Quota: 600

Management Evaluation

Current Postseason Population Management Objective: 12,000

Management Strategy: Recreational

2012 Postseason Population Estimate: 6,000

2013 Proposed Postseason Population Estimate: 6,000

The Bates Hole / Hat Six Mule Deer Herd Unit has a postseason management objective of 12,000 deer. The herd is managed using the recreational management strategy, with a goal of maintaining postseason buck ratios between 20-29 bucks per 100 does. The objective and management strategy were last revised in 1990, and will be formally reviewed in 2015.

Herd Unit Issues

Hunting access within the herd unit is very good, with large tracts of public lands as well as a sizeable hunter management area. The main land use within the herd unit is traditional ranching and grazing of livestock. Very little industrial or energy development exists in this herd unit. Area 67, which includes the northern portion of Casper Mountain, remains closed to hunting. Residents of small properties that dominate the hunt area are strongly opposed to hunting in their portion of the herd unit.

Weather

The winter of 2011-2012 was mild with below average snow accumulations and relatively warm temperatures. The growing season of 2012 and early winter of 2013 were extremely dry with above average temperatures. During the same time period, available water, forage growth, and

forage quality were below average in some parts of the herd unit. Areas at higher elevation south of Muddy Mountain appeared to receive more frequent precipitation during the summer of 2012. As a result, fawn productivity was better here and may have contributed to better fawn ratios compared to adjacent herd units. While the first part of the 2012-2013 was mild, snow events have become more frequent during the later part of winter. While this creates the potential for higher late-winter mortality, the moisture could prove valuable to spring growth of herbaceous plants and shrubs and charging of reservoirs and riparian areas.

Habitat

This herd unit has several established transects that measure production (N=3) and utilization (N=8) on True Mountain Mahogany (*Cercocarpus montanus*). Average leader growth in 2012 on mahogany was 0.30 inches (7.6 mm) - the worst production since 2004. Utilization was light, with an average of 13.6% leaders browsed per shrub. Such poor herbaceous plant production was a result of the 2012 drought. Lactating does and their fawns in particular are likely to have suffered diminished nutrition during the last growing season. However, some portions of the herd unit appeared to be in better condition resulting from more frequent rain events – in particular those areas south of Muddy Mountain and at slightly higher elevation in Bates Hole. Better habitat conditions in this portion of the herd unit may have improved spring and summer fawn survival, and may account for the higher fawn ratio in this herd unit compared to adjacent units.

Field Data

Fawn ratios were relatively good in this herd from 1998-2005. The population remained relatively stable, until increased issuance of doe/fawn licenses and longer seasons decreased the herd from approximately 9,300 to 7,000 deer. From 2006-present, fawn ratios were moderate to poor. The population began to decline, and with it doe/fawn licenses were reduced and then eliminated. Season length was decreased from 11 to 7 days, and the herd has remained stable near 6,000 animals from 2010-2012.

Buck ratios for the Bates Hole / Hat Six Herd historically average in the mid-20s, though they have occasionally exceeded recreational limits and risen into the low to mid 30's. In more recent years, the buck ratio has declined to the low 20s per 100 does, and in 2012 it reached a low of 17 per 100 does. Many landowners and hunters have complained of too much hunter pressure within the herd unit and a lack of mature bucks. Some have voiced a desire to change the herd unit from a general license area to limited quota as a means to improve buck ratios. In 2012, 48% of field-checked deer were yearling bucks, indicating that hunters either were not being selective for mature bucks, or had difficulty finding mature bucks and thus harvested yearlings. In either case, young bucks are being harvested before they reach maturity, and hunter satisfaction was

lower in this herd unit than any other in the Casper Biologist District (44%). Improved fawn production, improved fawn survival, and/or reduced harvest of yearling bucks will be necessary to improve mature buck ratios and presumably raise hunter satisfaction in future years.

Harvest Data

Hunter success in this herd has fluctuated as a function of population size and season length. In recent years, harvest success was highest when the population was higher and the season was longer. Harvest success has decreased in recent years and hunter days have increased, as the population declined and the season was shortened. The season was reduced to 8 days in 2010 and then to 7 days in 2011-2012. The nonresident Region D quota was reduced from 2,100 to 1,000 licenses in 2012 to reduce harvest pressure as fawn ratios and herd size declined. Since 2010, with shorter seasons and fewer nonresident hunters, the herd has held steady at around 6,000 animals. No significant female harvest has been prescribed since 2007.

Population

The 2012 postseason population estimate was approximately 6,000 and has been stable in recent years, though the herd reached a high of about 9,300 deer in 1999 and has declined since then. Postseason classification data and harvest data are applied to the model to predict population size and trends for this herd. No sightability or other population estimate data are currently available to further align the model.

The “Semi-Constant Juvenile – Semi-Constant Adult Survival (SCJ,SCA) spreadsheet model was chosen for the postseason population estimate of this herd. This model seemed the most representative of the herd in terms of trend after an adjustment was made to juvenile survival in the years 2005 and 2006. In most years it is feasible that juvenile survival is low. However, survival was thought to be higher for juveniles in 2005 and 2006, as winters were very mild. One can also reference the TSJ,CA model and note that it adjusts for high juvenile survival in these years as well. Rather than using entire the TSJ,CA model with higher penalties, the simpler SCJ,SCA model can be used by only changing juvenile survival rates for these two years. The CJ,CA model depicts a herd that is larger than managers suspect, and does not align as well with buck ratios as the SCJ,SCA model. Thus, its total fit is not as good and resulting AIC score is higher. While the SCJ,SCA model has the lowest AIC of the three models, all three models have relatively close scores. The SCJ,SCA model ultimately appears to be the best representation relative to the perceptions of managers and field personnel, is of good quality, and follows trends with license issuance and harvest success.

Management Summary

Opening day for hunting the Bates Hole / Hat Six Mule Deer Herd has traditionally been October 15th, with closing dates that have changed to offer greater or lesser opportunity depending on the management direction desired. General licenses have been valid only for antlered mule deer since 2000. Doe/fawn licenses have been offered in years when winter range shrub utilization has been excessive. A short, seven-day season with no doe/fawn licenses will be instated for 2013. Nonresident Region D quotas will be reduced to 600 licenses in 2013, to compensate for the transition of several hunt areas in the region from general license to limited quota and further reduce harvest pressure region-wide. Managers have also applied an antler point restriction (APR) of three points or more on a side for this herd unit. The required selectivity of an APR season will allow yearling bucks to be recruited into mature age classes. While the APR harvest regime may improve buck ratios and quality in the short term by lowering overall harvest on bucks, it is fawn productivity and survival that must improve markedly for this herd to grow as a whole.

If we attain the projected harvest of 205 deer with fawn ratios similar to the last five years, this herd will continue to remain stable. The predicted 2013 postseason estimate for the Bates Hole Hat Six Herd is approximately 6,000 animals.

INPUT	
Species:	Deer
Biologist:	Heather O'Brien
Herd Unit & No.:	MD757 Bates Hole-Hat Six
Model date:	02/28/13

☐ Clear form

MODELS SUMMARY				Check best model to create report		Notes
				Relative AICc	Fit	
CJ,CA	Constant Juvenile & Adult Survival			121	112	
SCJ,SCA	Semi-Constant Juvenile & Semi-Constant Adult Survival			81	66	
TSJ,CA	Time-Specific Juvenile & Constant Adult Survival			132	13	

Population Estimates from Top Model										
Year	Posthunt Population Est.		Trend Count		Predicted Prehunt Population			Predicted Posthunt Population		
	Field Est	Field SE			Juveniles	Total Males	Females	Juveniles	Total Males	Females
1993					2974	1133	4947	2955	619	4604
1994					2740	1117	4506	2727	912	4382
1995					2793	1321	4272	2793	1040	4272
1996					3992	1443	4191	3992	1105	4191
1997					3563	1738	4362	3563	1437	4362
1998					3258	1934	4422	3258	1474	4415
1999					3559	1905	4406	3559	1294	4406
2000					2650	1812	4459	2650	1215	4459
2001					2847	1963	4321	2841	1043	4283
2002					3473	1455	4210	3462	975	4142
2003					3133	1522	4214	3117	1063	4055
2004					2561	1527	4072	2543	983	3819
2005					2662	1353	3756	2623	876	3495
2006					1841	1859	4087	1827	1260	3928
2007					2336	1848	4117	2309	1284	3984
2008					2483	1554	3849	2481	1019	3841
2009					2149	1363	3762	2149	788	3744
2010					1624	1100	3614	1624	725	3602
2011					2253	941	3388	2253	604	3388
2012					2000	965	3331	2000	707	3324
2013					1864	1001	3226	1864	781	3221
2014										
2015										
2016										
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Survival and Initial Population Estimates

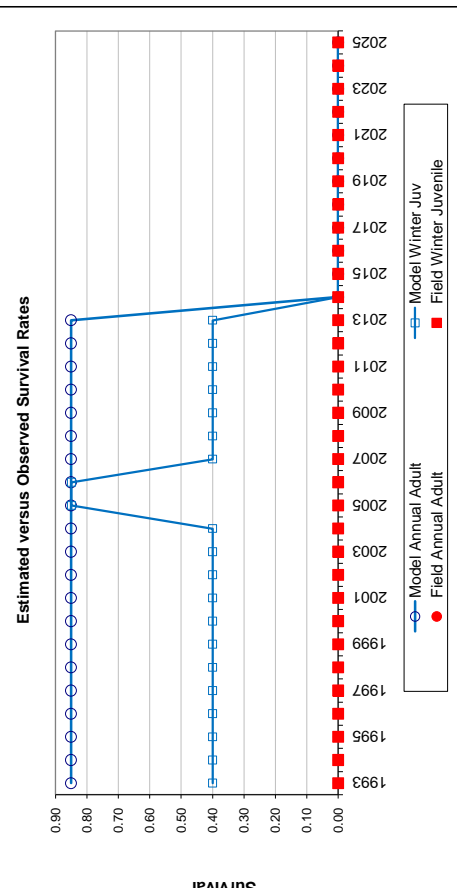
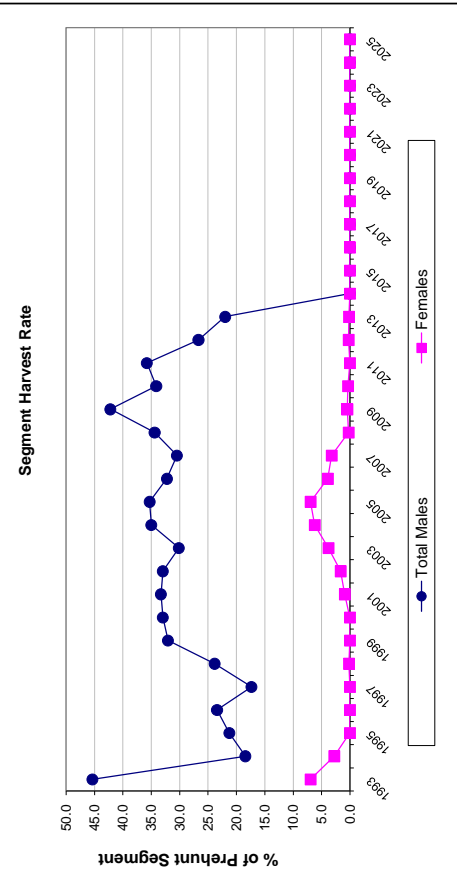
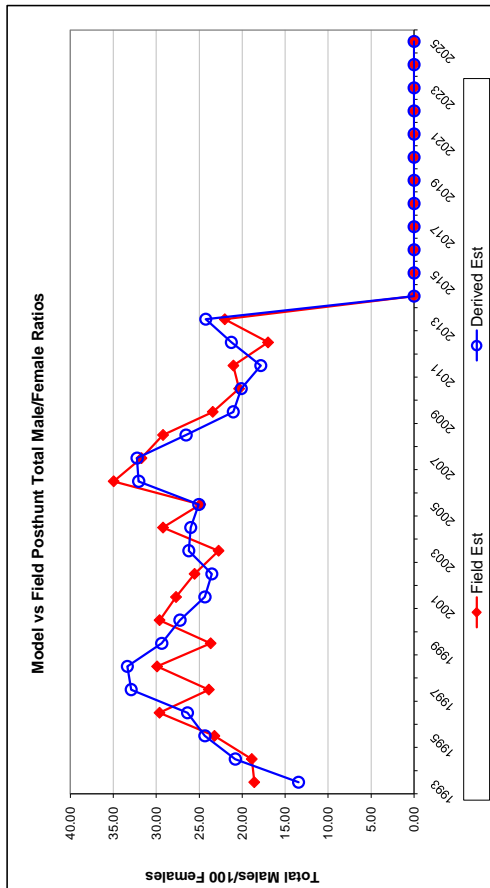
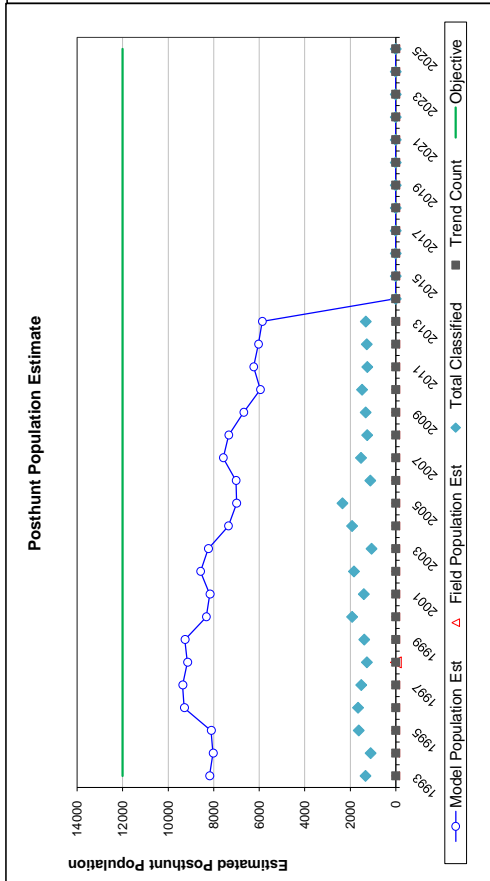
Year	Annual Juvenile Survival Rates		Annual Adult Survival Rates	
	Model Est	Field Est	Model Est	Field Est
1993	0.40		0.85	
1994	0.40		0.85	
1995	0.40		0.85	
1996	0.40		0.85	
1997	0.40		0.85	
1998	0.40		0.85	
1999	0.40		0.85	
2000	0.40		0.85	
2001	0.40		0.85	
2002	0.40		0.85	
2003	0.40		0.85	
2004	0.40		0.85	
2005	0.85		0.85	
2006	0.85		0.85	
2007	0.40		0.85	
2008	0.40		0.85	
2009	0.40		0.85	
2010	0.40		0.85	
2011	0.40		0.85	
2012	0.40		0.85	
2013	0.40		0.85	
2014				
2015				
2016				
2017				
2018				
2019				
2020				
2021				
2022				
2023				
2024				
2025				

Parameters:		Optim cells
Juvenile Survival =		0.400
Adult Survival =		0.850
Initial Total Male Pop/10,000 =		0.062
Initial Female Pop/10,000 =		0.460

MODEL ASSUMPTIONS	
Sex Ratio (% Males) =	50%
Wounding Loss (total males) =	10%
Wounding Loss (females) =	10%
Wounding Loss (juveniles) =	10%

Year	Classification Counts					Harvest				
	Juvenile/Female Ratio		Total Male/Female Ratio			Juv		Males		Total Harvest
	Derived Est	Field Est	Field SE	Derived Est	Field Est w/o bull adj	Field SE	Juv	Males	Females	
1993		64.19	3.81	13.44	18.60	1.74	17	467	312	786
1994		62.23	4.07	20.81	18.88	1.92	12	187	113	312
1995		65.39	3.54	24.35	23.23	1.82	0	255	0	255
1996		95.24	5.03	26.38	29.62	2.28	0	307	0	307
1997		81.68	4.49	32.94	23.88	2.00	0	274	0	274
1998		73.79	4.54	33.37	29.90	2.50	0	419	6	425
1999		80.77	4.65	29.37	23.67	2.08	0	555	0	555
2000		59.43	3.06	27.25	29.62	1.95	0	543	0	543
2001		66.34	3.91	24.35	27.70	2.21	5	473	35	513
2002		83.58	4.18	23.55	25.54	1.91	10	436	62	508
2003		76.88	5.06	26.22	22.74	2.29	14	417	145	576
2004		66.60	3.37	26.00	29.21	1.96	16	486	230	732
2005		75.04	3.35	25.05	24.87	1.63	36	434	237	707
2006		46.50	3.33	32.07	34.96	2.77	13	545	144	702
2007		57.96	3.37	32.24	31.72	2.28	25	512	121	688
2008		64.61	4.05	26.54	29.21	2.42	2	486	8	496
2009		57.40	3.52	21.04	23.42	1.99	0	523	16	539
2010		45.08	2.70	20.12	20.36	1.66	0	341	11	352
2011		66.52	4.08	17.84	21.02	1.95	0	306	0	306
2012		60.17	3.66	21.28	16.99	1.66	0	234	7	241
2013		57.87	3.54	24.26	22.02	1.92	0	200	5	205
2014										
2015										
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2024										
2025										

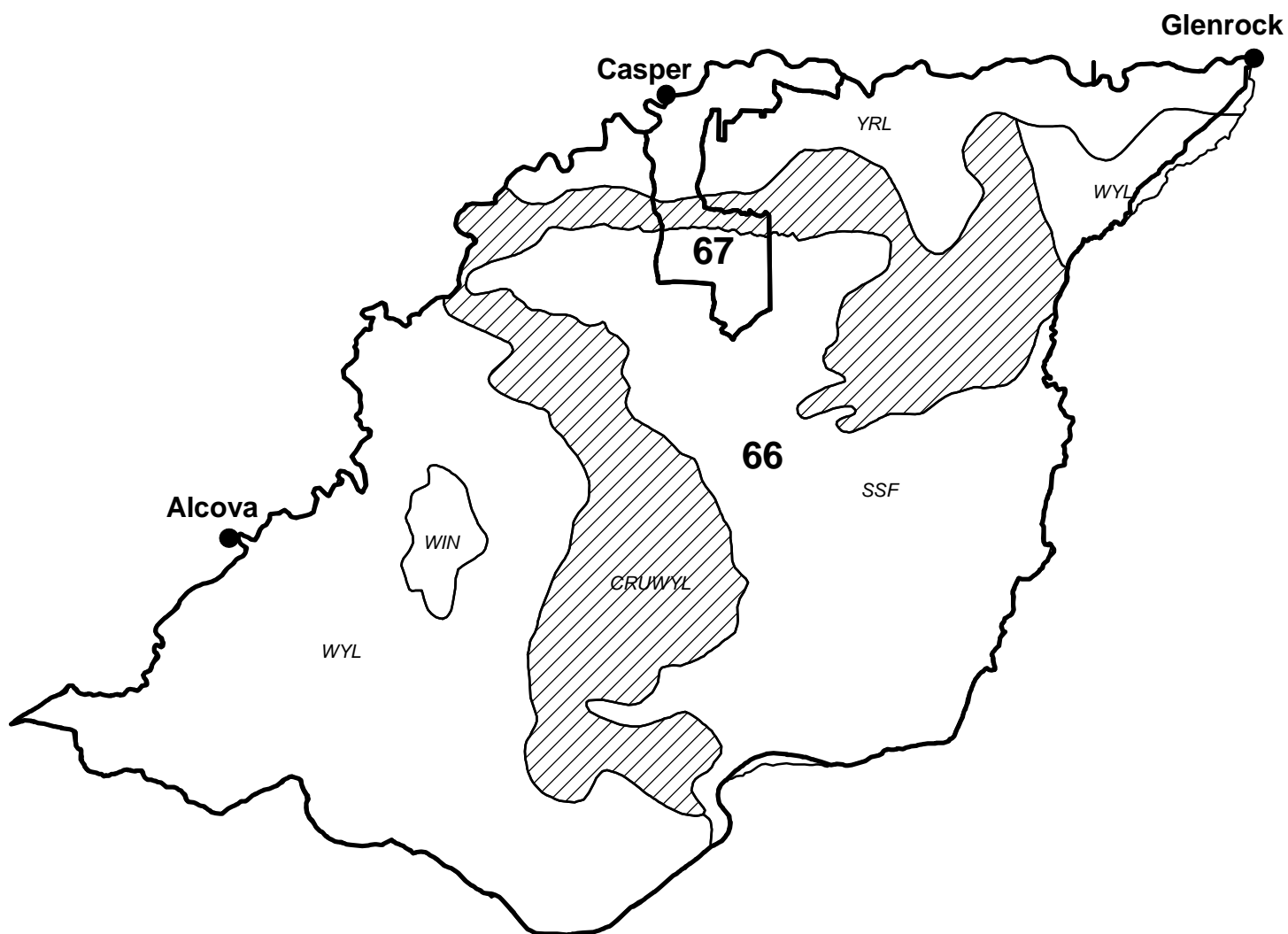
FIGURES



Comments:

END

Mule Deer - Bates Hole/Hat Six
Hunt Area 66, 67
Casper Region
Revised 2/94



2012 - JCR Evaluation Form

SPECIES: Mule Deer

PERIOD: 6/1/2012 - 5/31/2013

HERD: MD758 - RATTLESNAKE

HUNT AREAS: 88-89

PREPARED BY: HEATHER
O'BRIEN

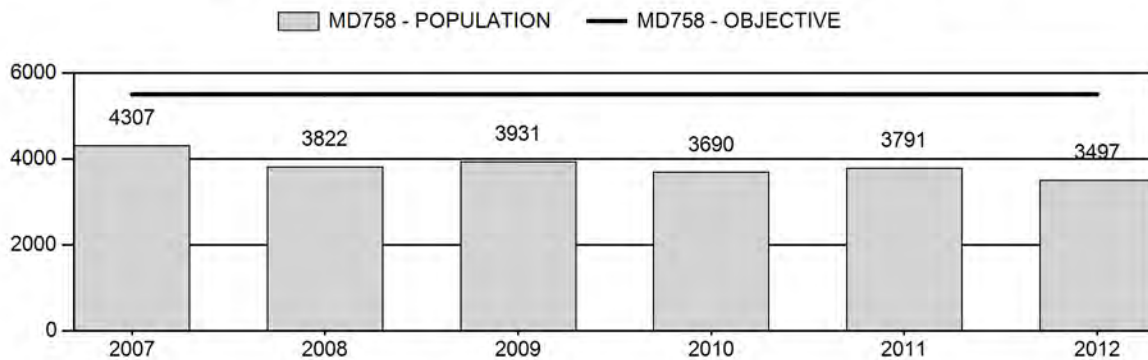
	<u>2007 - 2011 Average</u>	<u>2012</u>	<u>2013 Proposed</u>
Population:	3,908	3,497	3,874
Harvest:	467	221	155
Hunters:	685	463	310
Hunter Success:	68%	48%	50%
Active Licenses:	750	480	300
Active License Percent:	62%	46%	52%
Recreation Days:	2,988	1,563	1,100
Days Per Animal:	6.4	7.1	7.1
Males per 100 Females	39	32	
Juveniles per 100 Females	55	47	

Population Objective:	5,500
Management Strategy:	Special
Percent population is above (+) or below (-) objective:	-36.4%
Number of years population has been + or - objective in recent trend:	19
Model Date:	5/7/2013

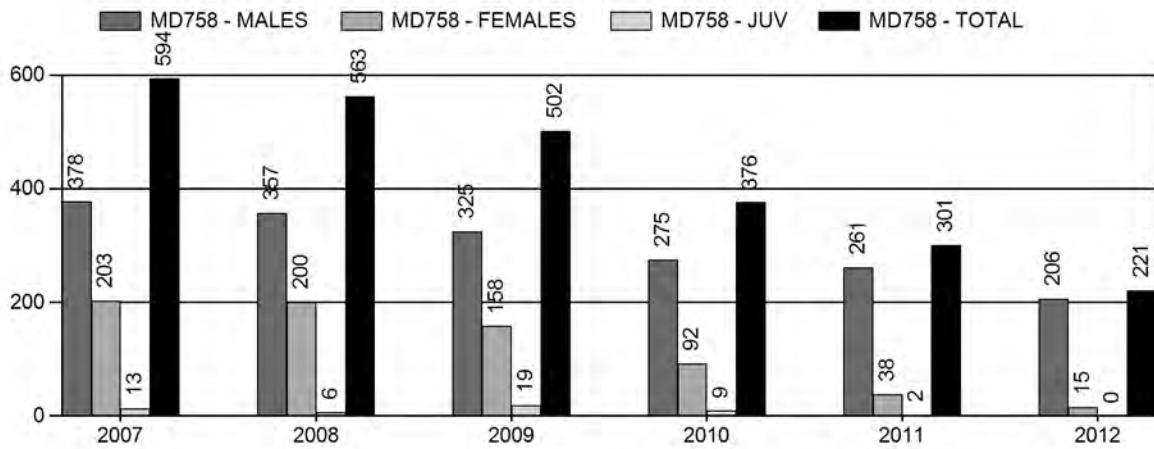
Proposed harvest rates (percent of pre-season estimate for each sex/age group):

	<u>JCR Year</u>	<u>Proposed</u>
Females ≥ 1 year old:	.8%	.5%
Males ≥ 1 year old:	26.8%	17.3%
Juveniles (< 1 year old):	0%	0%
Total:	5.9%	3.8%
Proposed change in post-season population:	-9.22%	9.02%

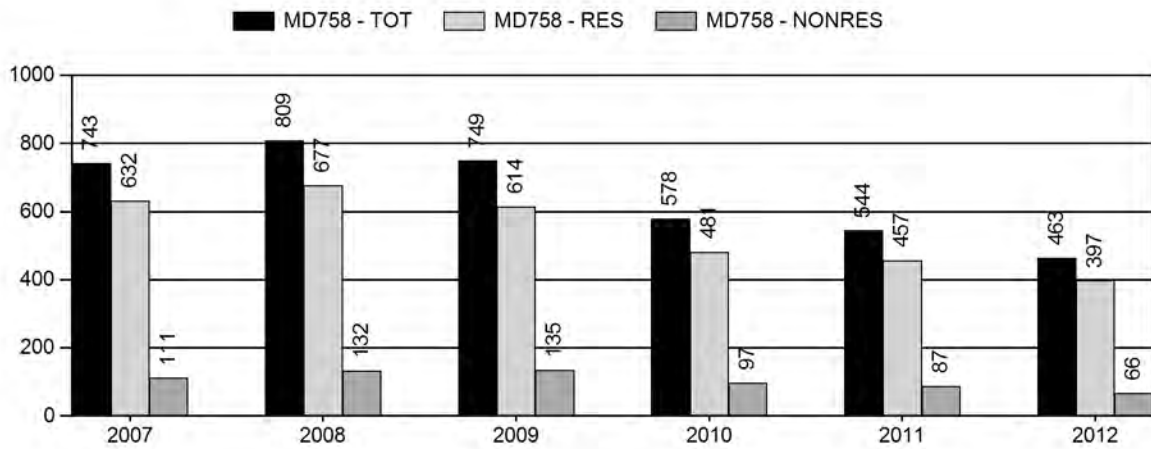
Population Size - Postseason



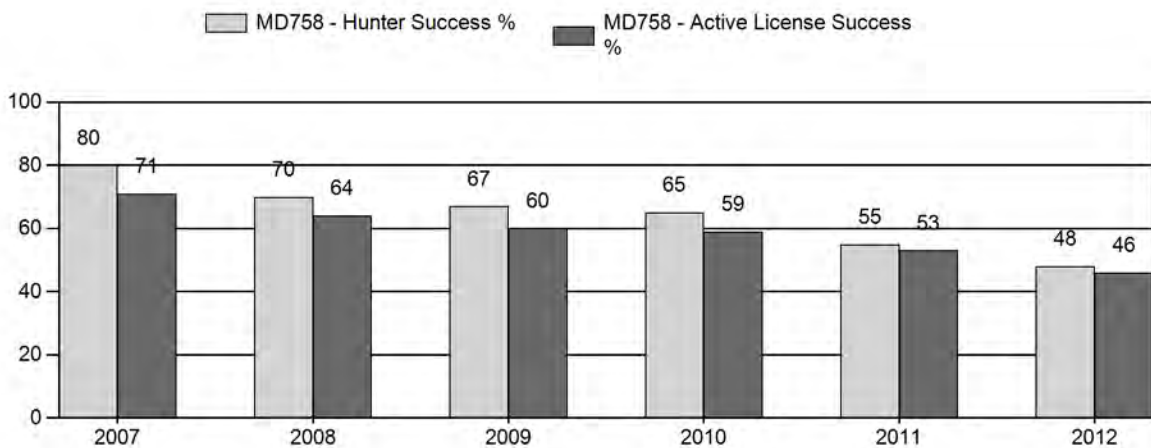
Harvest



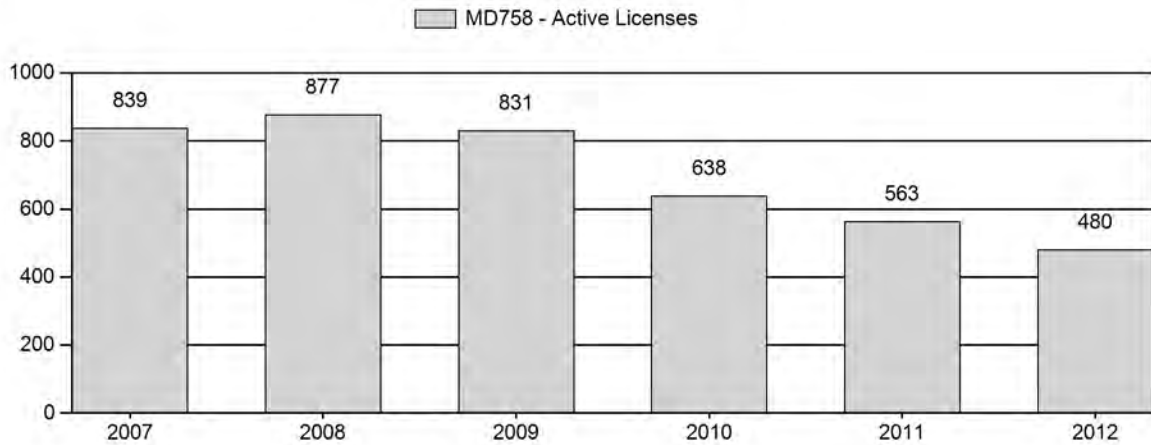
Number of Hunters



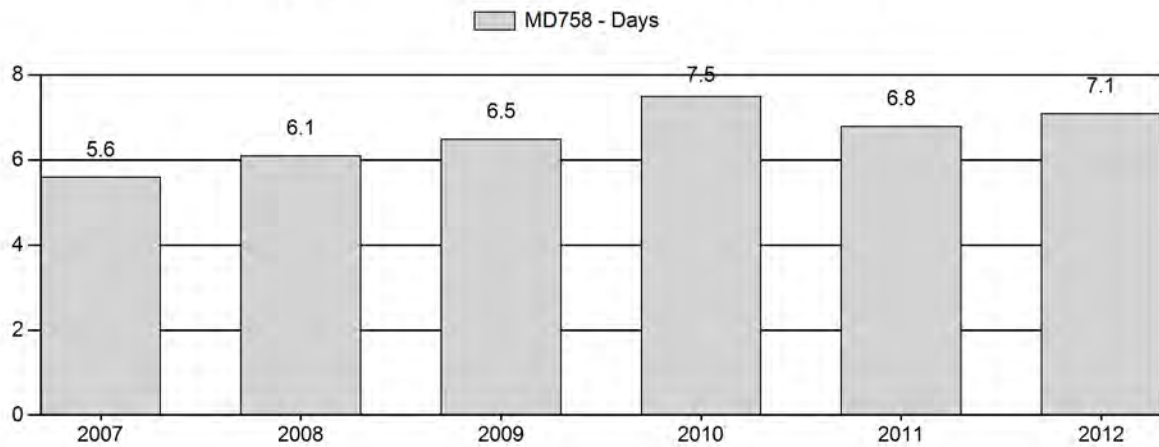
Harvest Success



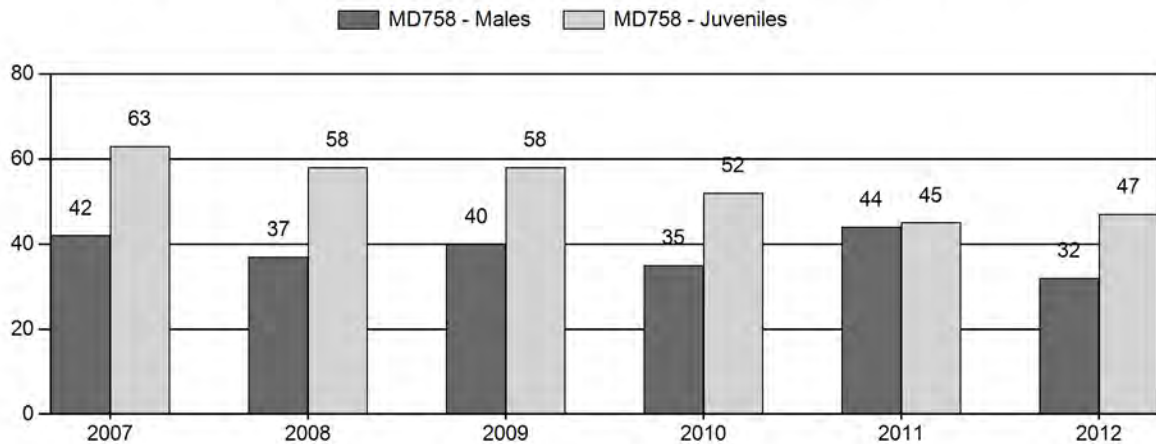
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2007 - 2012 Postseason Classification Summary

for Mule Deer Herd MD758 - RATTLESNAKE

Year	Post Pop	MALES				FEMALES		JUVENILES		Tot Cls	Cls Obj	Males to 100 Females				Young to		
		Ylg	Adult	Total	%	Total	%	Total	%			Ylng	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2007	4,310	50	101	151	20%	360	49%	227	31%	738	1,078	14	28	42	± 5	63	± 6	44
2008	3,824	94	185	279	19%	749	51%	434	30%	1,462	924	13	25	37	± 3	58	± 4	42
2009	3,934	34	155	189	20%	469	50%	271	29%	929	922	7	33	40	± 4	58	± 5	41
2010	3,694	49	120	169	19%	487	54%	252	28%	908	797	10	25	35	± 3	52	± 4	38
2011	3,796	53	196	249	23%	570	53%	258	24%	1,077	781	9	34	44	± 4	45	± 4	32
2012	3,501	24	81	105	18%	333	56%	156	26%	594	830	7	24	32	± 4	47	± 5	36

**2013 HUNTING SEASONS
RATTLESNAKE MULE DEER (MD758)**

Hunt Area	Type	Date of Seasons		Quota	Limitations
88		Oct. 15	Oct. 21		General license; antlered mule deer or any white-tailed deer
	6	Oct. 15	Nov. 30	50	Limited quota licenses; doe or fawn valid on private land
89	1	Oct. 15	Oct. 31	125	Limited quota licenses; antlered deer
Archery		Sept. 1	Sept. 30		Refer to license type and limitations in Section 3

Hunt Area	Type	Quota change from 2012
88	6	
89	1	-50
Total	1	-50
	6	0

Management Evaluation

Current Postseason Population Management Objective: 5,500

Management Strategy: Special

2012 Postseason Population Estimate: 3,500

2013 Proposed Postseason Population Estimate: 3,900

The Rattlesnake Mule Deer Herd Unit has a postseason population objective of 5,500 deer. The herd is managed using the special management strategy, with the goal of maintaining postseason buck ratios between 30-45 bucks per 100 does. Management of this herd unit and interpretation of harvest data can be perplexing, with different management directions for Area 88 versus 89. The objective and management strategy were last revised in 1985, and will be formally reviewed in 2014.

Herd Unit Issues

Hunting access within the herd unit is moderate. While there are large tracts of public lands and several large walk-in areas in Area 89, there are also many parcels of private land with restricted access. Hunt Area 88 is dominated by private lands with several small public land parcels. Traditional ranching and grazing are the primary land use over the whole unit, with scattered

areas of oil and gas development. License issuance is consistently maintained in this hunt area to address potential damage issues on irrigated agricultural fields. Periodic disease outbreaks (i.e. hemorrhagic diseases) are possible in this herd and can contribute to population declines when environmental conditions are suitable.

Weather

The winter of 2011-2012 was mild with below average snow accumulations and relatively warm temperatures. The growing season of 2012 and early winter of 2013 were extremely dry with above average temperatures. During the same time period, available water, forage growth, and forage quality were below average. As a result, very poor fawn ratios of 47:100 does were observed during 2012 postseason classification surveys. Distribution of mule deer within the herd unit shifted to those few areas where water and forage were available along drainages and near reservoirs.

Habitat

This herd unit has no established habitat transects that measure production and/or utilization on shrub species that are preferred browse of mule deer. Additionally, there are no comparable habitat transects in neighboring herd units to reference. Anecdotal observations and discussions with landowners in the region indicate that summer and winter forage availability was very poor in 2012. Herbaceous forage species were observed to be in extremely poor condition, which likely contributed to diminished nutrition for lactating does and their fawns.

Field Data

Fawn ratios were high in this herd from 1998-2005, and the population grew in stages during this time period. License issuance was modest during this time period, until a larger number of doe/fawn licenses were introduced in Area 88 from 2003-2005. Fawn ratios were then moderate to poor from 2006-2012, and the population gradually declined over these years. Issuance of doe/fawn licenses was reduced incrementally in accordance with this decline. Harsh winter conditions in 2010-11 combined with severe drought in 2012 produced the lowest fawn ratios in over 15 years for the herd unit. Only 50 doe/fawn licenses were issued in Area 88 in 2012 to stay abreast of agricultural damage.

Buck ratios for the Rattlesnake Mule Deer Herd have been consistently maintained within special management parameters since 1999. As a result, hunters have developed high expectations for buck numbers and quality within this herd unit. Buck ratios for the herd are typically in the mid 30s per 100 does, but were as high as 44 bucks per 100 does in 2005 following several years of high fawn productivity. While this herd has dropped in overall

numbers over the past six years, buck ratios have been maintained consistently in the 30s and low 40s by adjusting Area 89 license issuance accordingly. Average tooth age of harvested bucks from 2012 hunters who submitted teeth (N=37) was 5.07, and median age was 4.5 years, indicating that mature bucks are still available for harvest within the herd. It can be difficult to maintain buck ratios over the entire herd unit, as Area 88 is managed for a low number of deer and Area 89 is managed for high mature buck ratios. Managers will continue to adjust license numbers in the herd unit so as to maintain the buck ratio within special management parameters and assure that an adequate proportion of mature bucks are available for harvest.

Harvest Data

License success in this herd unit is typically in the 60-70th percentile. Success declined the last two years to 55% and 48% respectively and days per animal were higher. It can be difficult to use days per animal as a reference to population trends in this herd unit however, as hunters in Area 89 tend to be more selective of bucks and thus take more time to harvest a deer. Selectivity and low deer numbers likely combined in recent years to contribute to higher harvest days. License reductions from 275 licenses in 2008 to 175 licenses in 2011 and 2012 did not improve harvest success indicating fewer deer were available to fewer hunters. Despite lower success, hunters in Area 89 reported the highest level of satisfaction (79%) of any deer herd unit in the Casper Biologist District. Regardless, managers plan to reduce licenses further in 2013 as an effort to improve license success and maintain good buck ratios in the herd unit following exceptionally poor fawn productivity.

Population

The 2012 postseason population estimate was approximately 3,500 and trending downward from an estimated high of 4,800 deer in 2005. Postseason classification data and harvest data are applied to the model to predict population size and trends for this herd. No sightability or other population estimate data are currently available to further align the model.

The “Time-Specific Juvenile Survival – Constant Adult Survival” (TSJ,CA) spreadsheet model was selected for the postseason population estimate of this herd. This model seemed most representative of the herd, as it mirrors fluctuations in herd size observed by field personnel in previous years. The simpler models (CJ,CA and SCA,CA) select for the lowest constraint on juvenile survival but predict overall population sizes that are unreasonably high for the Rattlesnake Herd. If constraints on juvenile or adult survival are manipulated within acceptable ranges, these two models still do not track with known trends for the population. While the AIC for the TSJ,CA model is the highest of the three, it is only due to year-by-year penalties on juvenile survival and is still within one order of magnitude of the simpler models. The TSJ,CA model appears to be the best representation relative to the perceptions of managers on the ground

and follows trends with license issuance and harvest success, and is considered to be of good quality.

Management Summary

Traditional season dates in this herd run from October 15th through October 31st, and November 30th for Area 88 Type 6 licenses. The same season dates will be applied to the 2013 hunting season, with a reduction of Area 89-Type 1 licenses to track with poor fawn ratios and declining buck ratios. Area 88 Type 6 licenses will be valid on private land only. The 2013 season thus includes a total of 125 Type 1 licenses in Area 89, a general season in Area 88 for antlered mule deer or any white-tailed deer, and 50 Type 6 licenses valid in Area 88. While fawn ratios and population growth rates have been poor in recent years, habitat conditions are also poor due to recent drought. Goals for 2013 are to improve deer numbers gradually towards objective while giving time for habitats to recover, to improve buck ratios, and increase hunter success.

If we attain the projected harvest of 155 deer with fawn ratios similar to the five-year average, this herd will increase slightly in number. The predicted 2013 postseason population size for the Rattlesnake Mule Deer Herd Unit is approximately 3,900 deer.

INPUT

Species: Deer

Biologist: Heather O'Brien

Herd Unit & No.: Rattlesnake M/D

Model date: 02/28/13

☐ Clear form

MODELS SUMMARY				Check best model to create report		Notes
				Relative AICc	Fit	
CJ,CA	Constant Juvenile & Adult Survival			53	44	
SCJ,SCA	Semi-Constant Juvenile & Semi-Constant Adult Survival			60	46	
TSJ,CA	Time-Specific Juvenile & Constant Adult Survival			127	9	

Population Estimates from Top Model											
Year	Posthunt Population Est.		Trend Count		Predicted Prehunt Population			Predicted Posthunt Population			Objective
	Field Est	Field SE			Juveniles	Total Males	Females	Juveniles	Total Males	Females	
1993					1163	617	2174	1141	213	1958	5500
1994					849	569	2054	812	389	1835	5500
1995					986	610	1841	971	456	1768	5500
1996					1689	597	1714	1689	511	1714	5500
1997					1559	773	1797	1539	538	1706	5500
1998					1217	766	1760	1210	420	1694	5500
1999					1519	902	1987	1510	620	1872	5500
2000					1185	953	2019	1167	663	1873	5500
2001					1305	879	1908	1305	639	1817	5500
2002					1397	844	1847	1374	610	1735	5500
2003					1345	794	1752	1339	569	1642	5500
2004					1506	930	1844	1492	647	1744	5500
2005					1827	1222	2156	1816	890	2053	5500
2006					1244	1243	2233	1240	883	2090	5500
2007					1339	1297	2324	1325	881	2101	5500
2008					1137	1133	2171	1131	740	1951	5500
2009					1174	1139	2170	1153	782	1996	5500
2010					1022	1024	2058	1012	721	1956	5500
2011					943	1069	2121	941	772	2078	5500
2012					937	846	1957	937	619	1941	5500
2013					1074	923	2048	1074	763	2037	5500
2014											5500
2015											5500
2016											5500
2017											5500
2018											5500
2019											5500
2020											5500
2021											5500
2022											5500
2023											5500
2024											5500
2025											5500

Survival and Initial Population Estimates

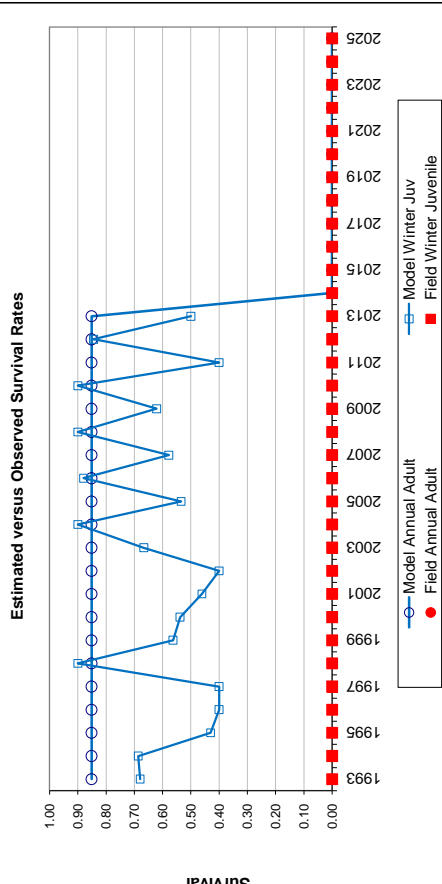
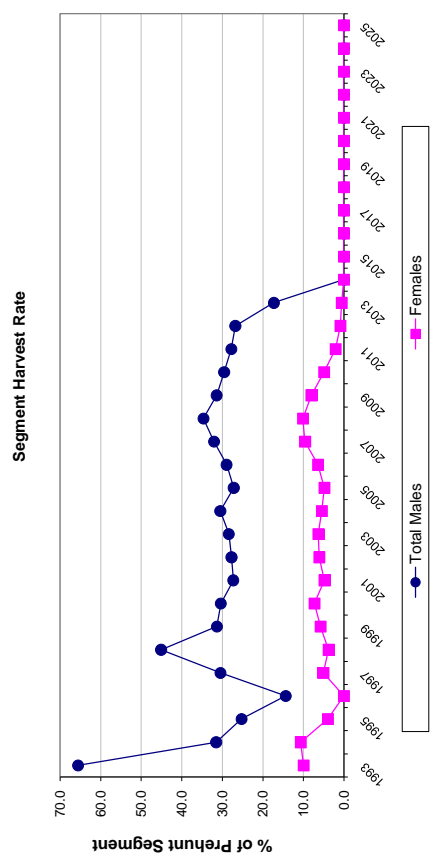
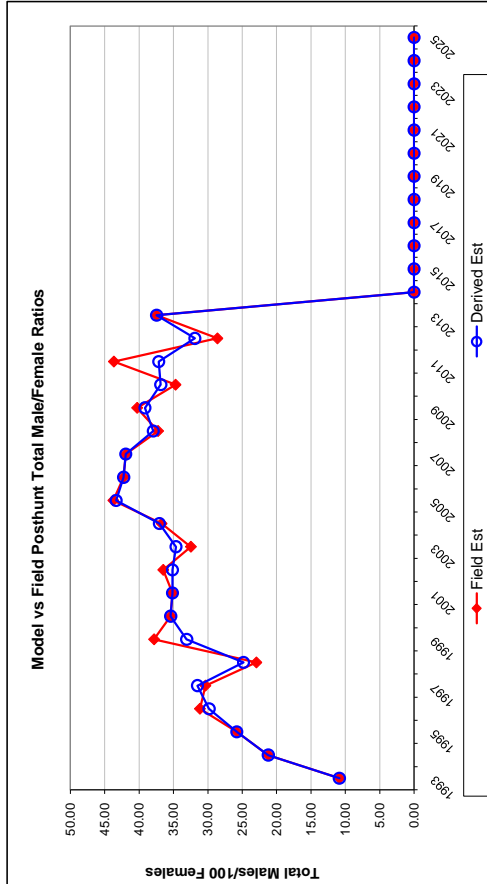
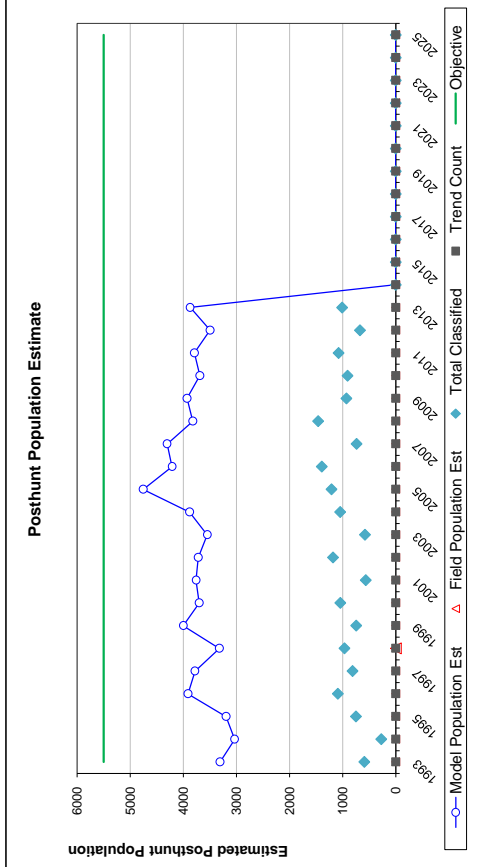
Year	Annual Juvenile Survival Rates		Annual Adult Survival Rates	
	Model Est	Field Est SE	Model Est	Field Est SE
1993	0.68		0.85	
1994	0.69		0.85	
1995	0.43		0.85	
1996	0.40		0.85	
1997	0.40		0.85	
1998	0.90		0.85	
1999	0.56		0.85	
2000	0.54		0.85	
2001	0.46		0.85	
2002	0.40		0.85	
2003	0.67		0.85	
2004	0.90		0.85	
2005	0.53		0.85	
2006	0.88		0.85	
2007	0.58		0.85	
2008	0.90		0.85	
2009	0.62		0.85	
2010	0.90		0.85	
2011	0.40		0.85	
2012	0.84		0.85	
2013	0.50		0.85	
2014				
2015				
2016				
2017				
2018				
2019				
2020				
2021				
2022				
2023				
2024				
2025				

Parameters:		Optim cells
Adult Survival =		0.851
Initial Total Male Pop/10,000 =		0.021
Initial Female Pop/10,000 =		0.196

MODEL ASSUMPTIONS	
Sex Ratio (% Males) =	50%
Wounding Loss (total males) =	10%
Wounding Loss (females) =	10%
Wounding Loss (juveniles) =	10%

Year	Classification Counts					Harvest				
	Juvenile/Female Ratio		Total Male/Female Ratio			Juv		Males		Total Harvest
	Derived Est	Field Est	Field SE	Derived Est	Field Est w/o bull adj	Field SE	Juv	Males	Females	
1993		58.29	5.13	10.86	10.86	1.85	20	368	197	565
1994		44.24	6.22	21.21	21.21	3.95	34	163	199	362
1995		54.94	4.53	25.78	25.78	2.80	13	140	66	206
1996		98.53	6.42	29.83	31.16	2.93	0	78	0	78
1997		90.24	6.82	31.52	30.35	3.27	18	214	83	297
1998		71.43	4.96	24.80	22.94	2.38	6	314	60	374
1999		80.65	6.54	33.09	37.83	3.91	8	257	104	361
2000		62.31	4.38	35.42	35.42	3.01	16	263	133	396
2001		71.79	6.72	35.17	35.16	4.17	0	218	83	301
2002		79.20	5.09	35.16	36.50	3.02	21	213	102	315
2003		81.55	7.39	34.64	32.47	3.98	5	205	100	305
2004		85.56	5.81	37.08	36.73	3.27	13	258	91	349
2005		88.48	5.66	43.34	43.76	3.47	10	302	94	396
2006		59.33	3.70	42.26	42.26	2.95	4	327	130	457
2007		63.06	5.34	41.95	41.94	4.07	13	378	203	581
2008		57.94	3.50	37.94	37.25	2.61	6	357	200	557
2009		57.78	4.41	39.15	40.30	3.47	19	325	158	483
2010		51.75	4.02	36.86	34.70	3.10	9	275	92	367
2011		45.26	3.40	37.17	43.68	3.32	2	270	39	309
2012		48.29	4.34	31.90	28.61	3.11	0	206	15	221
2013		52.73	3.89	37.47	37.48	3.11	0	145	10	155
2014										
2015										
2016										
2017										
2018										
2019										
2020										
2021										
2022										
2023										
2024										
2025										

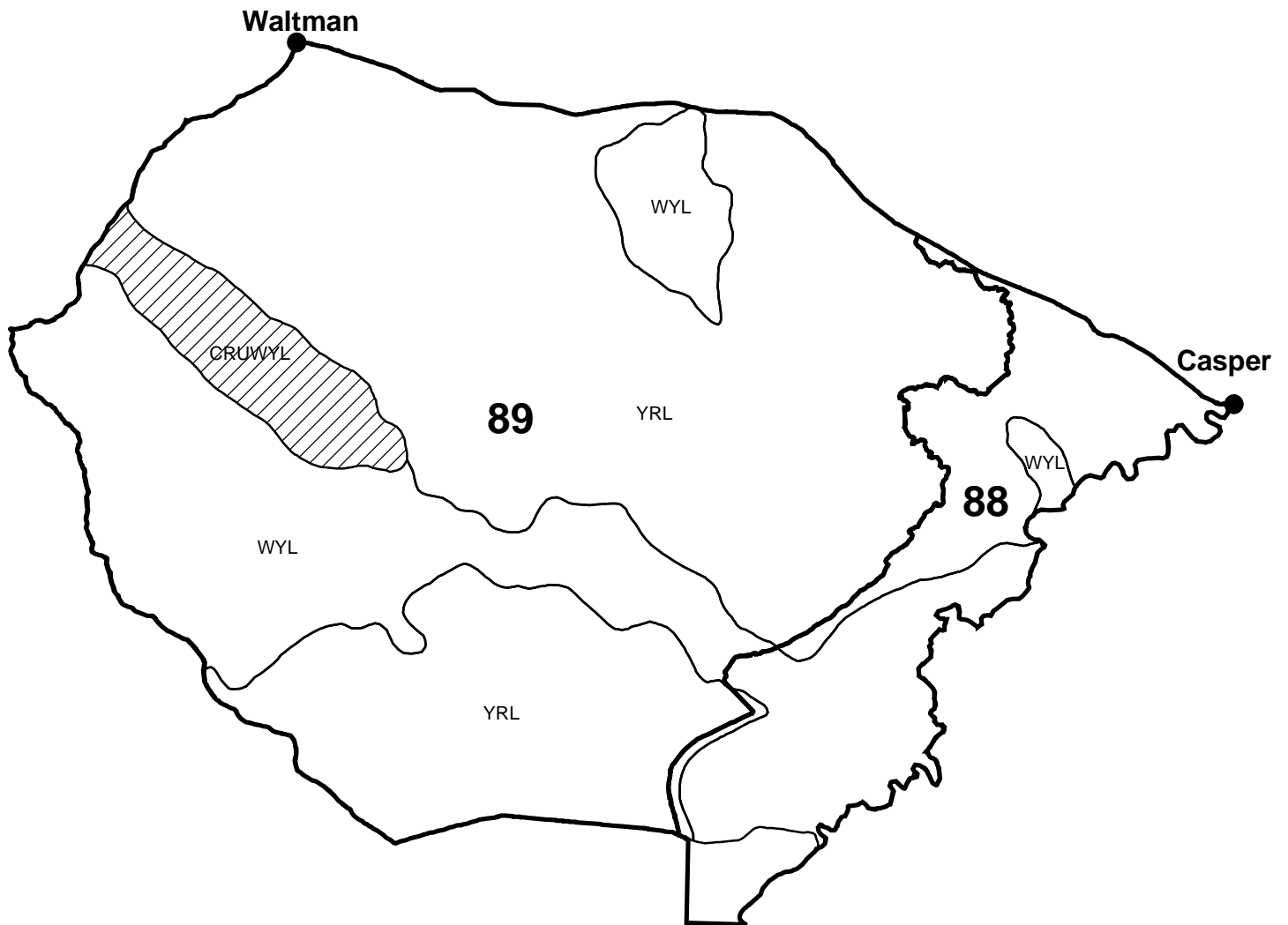
FIGURES



Comments:

END

Mule Deer - Rattlesnake
Hunt Areas 88, 89
Casper Region
Revised 4/88



2012 - JCR Evaluation Form

SPECIES: Mule Deer

PERIOD: 6/1/2012 - 5/31/2013

HERD: MD759 - NORTH NATRONA

HUNT AREAS: 34

PREPARED BY: HEATHER
O'BRIEN

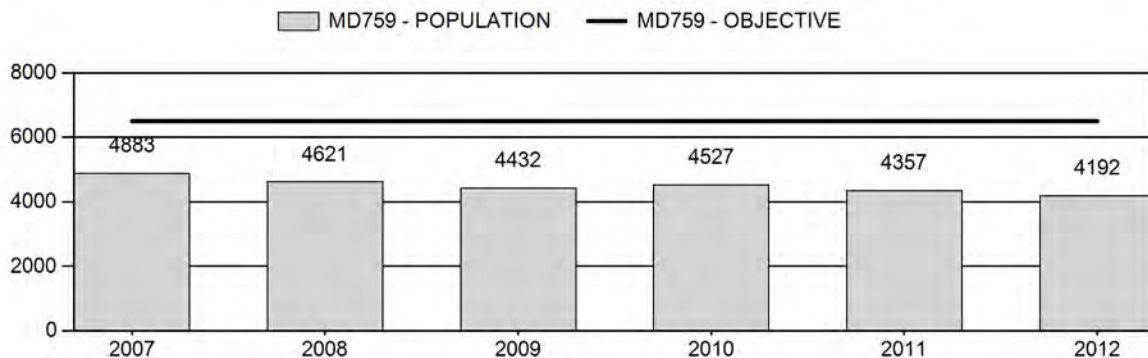
	<u>2007 - 2011 Average</u>	<u>2012</u>	<u>2013 Proposed</u>
Population:	4,564	4,192	4,234
Harvest:	285	196	200
Hunters:	361	256	255
Hunter Success:	79%	77%	78%
Active Licenses:	385	268	266
Active License Percent:	74%	73%	75%
Recreation Days:	1,541	1,188	1,200
Days Per Animal:	5.4	6.1	6
Males per 100 Females	38	30	
Juveniles per 100 Females	50	42	

Population Objective: 6,500
 Management Strategy: Special
 Percent population is above (+) or below (-) objective: -35.5%
 Number of years population has been + or - objective in recent trend: 19
 Model Date: 5/7/2013

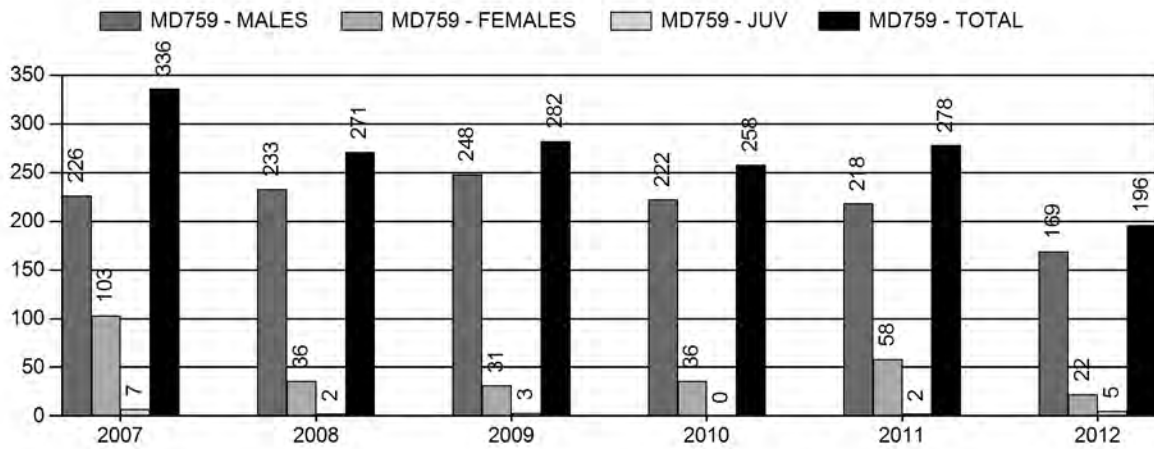
Proposed harvest rates (percent of pre-season estimate for each sex/age group):

	<u>JCR Year</u>	<u>Proposed</u>
Females \geq 1 year old:	1%	1%
Males \geq 1 year old:	18.6%	19.4%
Juveniles (< 1 year old):	.4%	.7%
Total:	4.49%	4.44%
Proposed change in post-season population:	-3.8%	1.0%

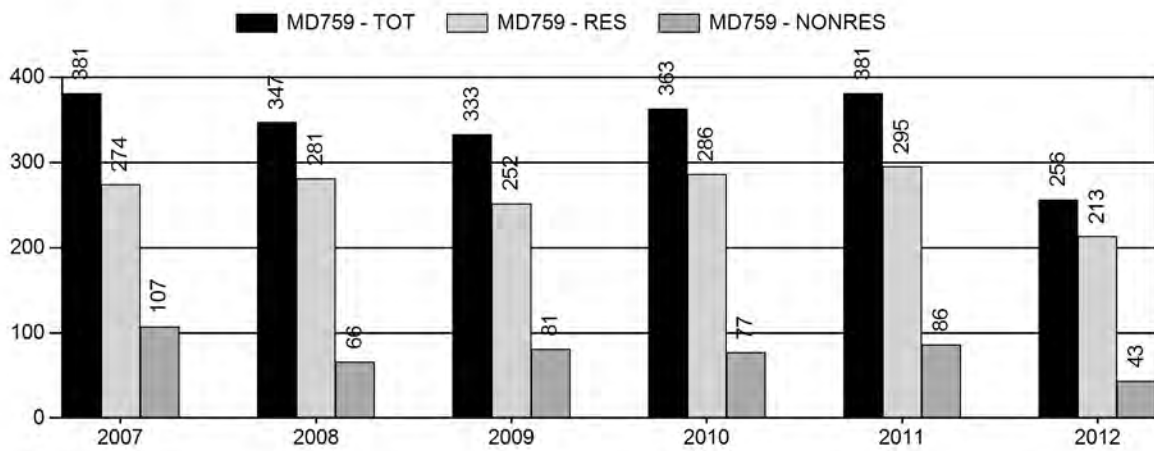
Population Size - Postseason



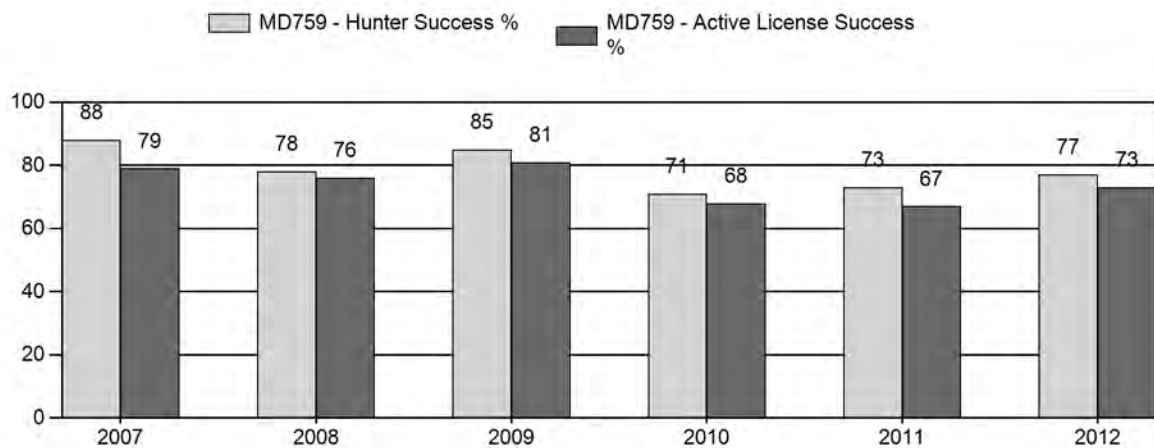
Harvest



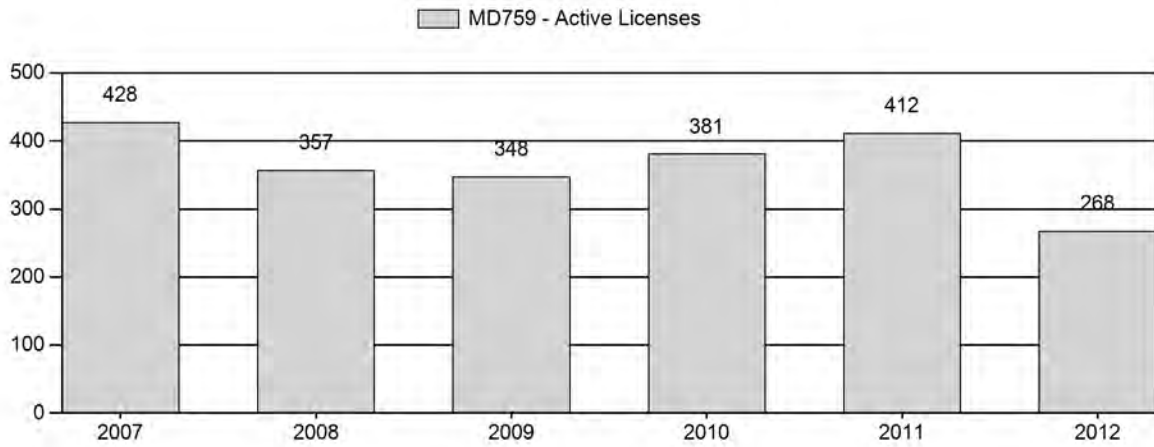
Number of Hunters



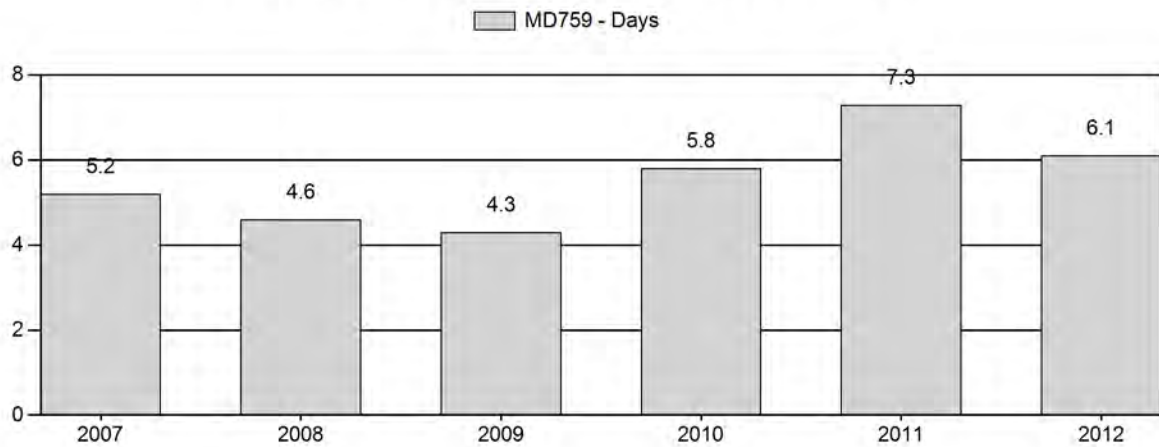
Harvest Success



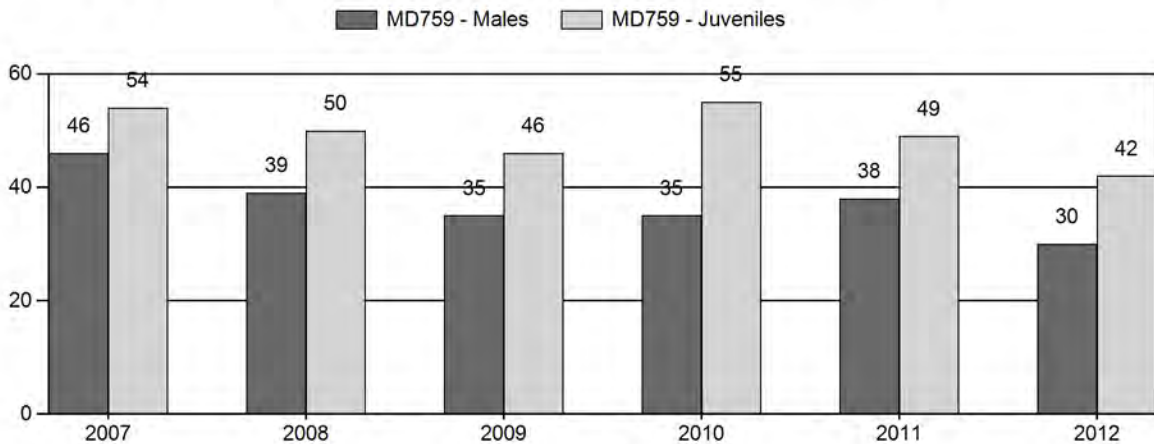
Active Licenses



Days per Animal Harvested



Postseason Animals per 100 Females



2007 - 2012 Postseason Classification Summary

for Mule Deer Herd MD759 - NORTH NATRONA

Year	Post Pop	MALES				FEMALES		JUVENILES		Tot Cls	Cls Obj	Males to 100 Females				Young to		
		Ylg	Adult	Total	%	Total	%	Total	%			Ylg	Adult	Total	Conf Int	100 Fem	Conf Int	100 Adult
2007	4,887	55	59	114	23%	247	50%	134	27%	495	820	22	24	46	± 6	54	± 7	37
2008	4,626	59	152	211	21%	543	53%	269	26%	1,023	760	11	28	39	± 4	50	± 4	36
2009	4,438	51	144	195	19%	558	55%	256	25%	1,009	668	9	26	35	± 3	46	± 4	34
2010	4,533	47	120	167	18%	476	53%	262	29%	905	830	10	25	35	± 4	55	± 5	41
2011	4,364	52	102	154	20%	406	53%	200	26%	760	851	13	25	38	± 4	49	± 5	36
2012	4,199	36	117	153	18%	503	58%	212	24%	868	760	7	23	30	± 3	42	± 4	32

2013 HUNTING SEASONS
NORTH NATRONA MULE DEER HERD (MD759)

Hunt Area	Type	Date of Seasons		Quota	Limitations
Opens	Closes				
34	1	Oct. 15	Oct. 31	250	Limited quota licenses; antlered deer
	3	Oct. 15	Nov. 31	50	Limited quota licenses; any white-tailed deer
	6	Oct. 15	Oct. 31	50	Limited quota; doe or fawn valid on private land east of the Bucknum Road (Natrona County Road 125) within the Casper Creek Drainage
	8	Oct. 15	Nov. 31	100	Limited quota; doe or fawn white-tailed deer
Archery		Sept. 1	Sept. 30		Refer to license types and limitations in Section 3

Hunt Area	Type	Quota change from 2012
34	1	0
	3	0
	6	0
	8	-100

Management Evaluation

Current Postseason Population Management Objective: 6,500

Management Strategy: Special

2012 Postseason Population Estimate: 4,200

2013 Proposed Postseason Population Estimate: 4,200

The North Natrona Herd Unit has a postseason population management objective of 6,500 mule deer. The herd is managed using the special management strategy, with the goal of maintaining postseason buck ratios between 30-45 bucks per 100 does. The objective and management strategy were last revised in 1988, and will be formally reviewed in 2014.

Herd Unit Issues

Hunting access within the herd unit is very good, with large tracts of public land as well as walk-in areas available for hunting. The southeastern corner of the herd unit is the only area dominated by private lands. In this area, specific doe/fawn licenses have been added to address damage issues on irrigated agricultural fields. The main land use within the herd unit is traditional ranching and grazing of livestock. Industrial-scale developments, including oil and gas development, are limited and isolated within this herd unit.

Weather

The winter of 2011-2012 was mild with below average snow accumulations and relatively warm temperatures. The growing season of 2012 through early winter of 2013 were extremely dry with above average temperatures. During the same time period, available water, forage growth, and forage quality were below average. As a result, very poor fawn ratios of 42:100 were observed during 2012 postseason classification surveys.

Habitat

This herd unit contains five habitat transects which measure annual production of curl leaf mountain mahogany (*Cercocarpus ledifolius*). In the fall of 2012, average leader growth was only .52 inches (13 mm), which was the poorest year for growth since 2002. Average leader growth from 2001-2011 was 1.27 inches (32 mm) by comparison. Poor leader growth on habitat transects corroborates field observations of a general lack of 2012-2013 winter forage, with the possible exception of areas at higher elevations within this herd unit. Herbaceous forage species were also observed to be in poor condition, which likely contributed to diminished nutrition for lactating does and their fawns.

Field Data

Fawn ratios were moderate (55-66 per 100 does) in this herd from 1998-2002, and license issuance during this time was higher with an emphasis on buck harvest. During the mild years of 2003-2005, fawn ratios were quite high (73-89 per 100 does). License issuance was very moderate during this time, and the population grew to a high of approximately 5,500 animals. From 2006-present, fawn ratios were moderate to poor, and reached a 15-year low in 2012. Consequently, license issuance was gradually lowered to track with diminished fawn production. The herd has been relatively stable near 4,000 animals from 2007-2012.

Buck ratios for the North Natrona Herd historically average in the mid 30s per 100 does. In 2012, observed buck ratios were on the cusp of special management, with 30 bucks per hundred

does. Type 1 license issuance remained stable at 350 since 2001, but was reduced to 250 in 2012. Managers intend to keep Type 1 licenses consistent at 250 for an additional year. If buck ratios drop below 30 following the 2013 harvest due to declining fawn productivity, licenses will be further reduced to compensate and manage the buck ratio back within special management parameters.

Harvest Data

Hunter success in the North Natrona Mule Deer Herd Unit is typically in the 70-80th percentile, and was 78% in 2012. While harvest success has remained average for the herd in recent years, days per animal have increased. Increasing days per animal typically indicate a shrinking population, as it takes hunters more time to find and harvest fewer animals. However survey totals, comments from hunters and landowners, and population modeling all indicate this herd has remained relatively stable. Thus, managers suspect hunters are being more selective, as the herd has developed a reputation of having high quality mature bucks. The low buck ratio in 2012 may have also contributed to increased hunter days in that year, but in all other years the buck ratio was well within special management limits.

Population

The 2012 postseason population estimate was approximately 4,200 and trending slightly downward after an estimated high of 5,200 deer in 2005. Postseason classification data and harvest data are applied to the model to predict population size and trends for this herd. No sightability or other population estimate data are currently available to further align the model.

The “Constant Juvenile Survival – Constant Adult Survival” (CJ,CA) spreadsheet model was chosen for the postseason population estimate of this herd. This model is the simplest and appears to be most representative of trends within the herd. The CJ,CA model selects adult survival rates that seem reasonable for this herd, but only if the juvenile survival rate is increased slightly. The lower constraint for juvenile survival was thus increased from 0.4 to 0.5. Managers believe this to be an acceptable adjustment, as it is small and accounts for slightly milder habitat and winter conditions, and produces a trend that tracks with observed fawn and buck ratios. The SCJ,SCA model is unnecessary since the simpler model tracks well with the herd unit. The TSJ,CA model, while it trends well with observed population dynamics, does not match trends reported for earlier years when the population was estimated to be larger, and both license issuance and harvest success were higher. All three models have AICs that are low and well within one magnitude of power of each other. Thus, AIC has little bearing on model selection for this herd. The CJ,CA model is considered to be of good quality in representing population trends and estimates for this herd and based on established model criteria.

Management Summary

Traditional season dates in this herd run for two weeks from October 15th through October 31st. The 2013 season follows the same season dates with 250 Type 1 and 50 Type 6 licenses, which is the same license issuance as 2012. Type 6 licenses will be valid on private lands in the southeastern corner of the hunt area, and are intended to address damage issues on agricultural fields. The only season change is the limitation of Type 6 license use to private lands only. This limitation will ensure that licenses to address agricultural damage and are not used to harvest does on public lands where they are not a damage issue.

If we attain the projected harvest of 200 mule deer with fawn ratios similar to the past 5 years, this herd will remain stable as it has for the past 5 years. The predicted 2013 postseason population size of the North Natrona Mule Deer Herd is approximately 4,200 animals.

INPUT

Species:
Biologist:
Herd Unit & No.:
Model date:

Deer
Heather O'Brien
MD 759 North Natrona
03/04/13

☐ Clear form

MODELS SUMMARY				Notes
		Fit	Relative AICc	Check best model to create report
CJ,CA	Constant Juvenile & Adult Survival	29	38	<input type="checkbox"/> CJ,CA Model
SCJ,SCA	Semi-Constant Juvenile & Semi-Constant Adult Survival	26	35	<input type="checkbox"/> SCJ,SCA Mod
TSJ,CA	Time-Specific Juvenile & Constant Adult Survival	5	123	<input type="checkbox"/> TSJ,CA Model

Population Estimates from Top Model												
Year	Posthunt Population Est.		Trend Count	Predicted Prehunt Population			Total	Predicted Posthunt Population			Total	Objective
	Field Est	Field SE		Juveniles	Total Males	Females		Juveniles	Total Males	Females		
1993				905	881	2435	4220	887	540	2234	3661	6500
1994				1202	699	2196	4096	1197	470	2093	3761	6500
1995				1429	715	2149	4293	1418	476	2037	3931	6500
1996				1684	775	2155	4614	1684	572	2095	4352	6500
1997				1485	926	2273	4685	1473	654	2221	4348	6500
1998				1266	946	2331	4543	1266	694	2285	4245	6500
1999				1350	930	2336	4616	1345	663	2230	4238	6500
2000				1225	922	2307	4454	1210	538	2225	3973	6500
2001				1447	778	2269	4494	1437	594	2164	4196	6500
2002				1234	885	2272	4391	1232	645	2204	4081	6500
2003				1668	878	2256	4801	1658	679	2208	4545	6500
2004				2034	1014	2366	5414	2032	747	2289	5068	6500
2005				1775	1168	2531	5473	1770	918	2431	5119	6500
2006				1130	1254	2591	4975	1128	967	2501	4596	6500
2007				1624	1137	2492	5252	1616	888	2379	4883	6500
2008				1224	1189	2506	4919	1222	932	2466	4621	6500
2009				1128	1130	2485	4742	1124	857	2451	4432	6500
2010				1325	1038	2447	4811	1325	794	2408	4527	6500
2011				1178	1033	2459	4670	1176	795	2386	4357	6500
2012				1008	997	2403	4408	1003	811	2379	4192	6500
2013				1134	967	2353	4454	1125	779	2330	4234	6500
2014												6500
2015												6500
2016												6500
2017												6500
2018												6500
2019												6500
2020												6500
2021												6500
2022												6500
2023												6500
2024												6500
2025												6500

Survival and Initial Population Estimates

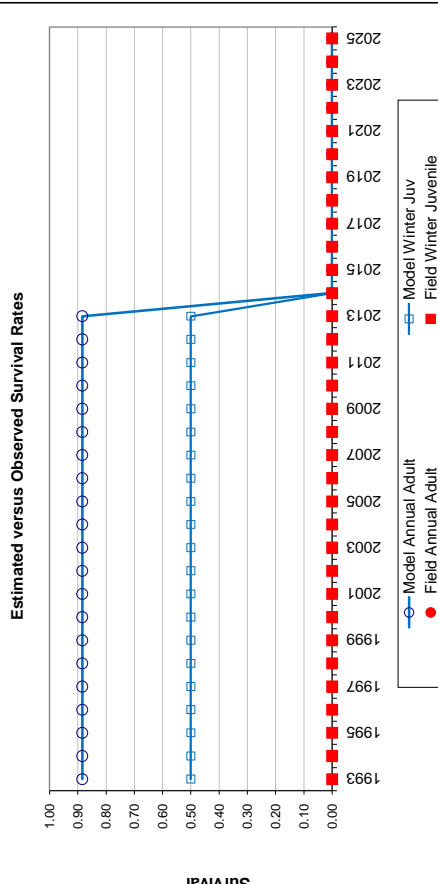
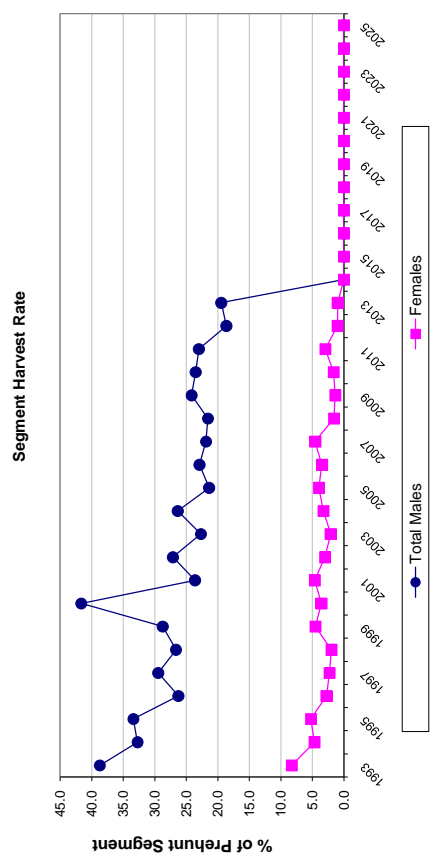
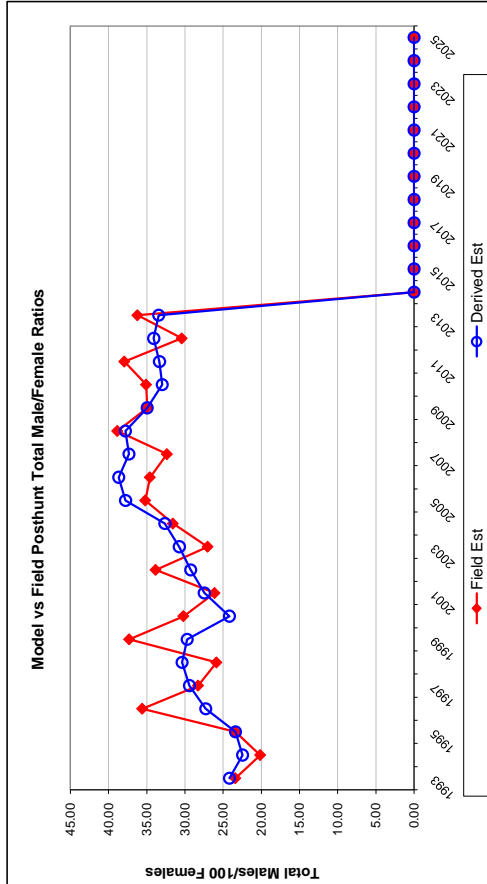
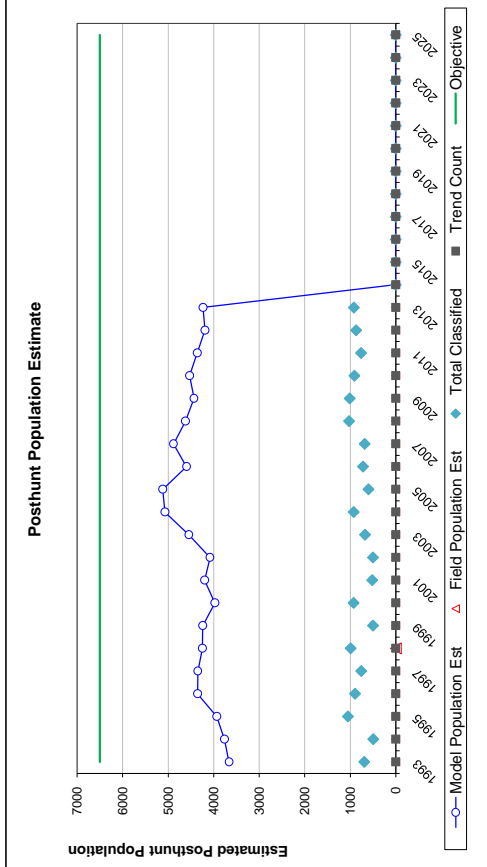
Year	Annual Juvenile Survival Rates		Annual Adult Survival Rates	
	Model Est	Field Est	Model Est	Field Est
1993	0.50		0.88	
1994	0.50		0.88	
1995	0.50		0.88	
1996	0.50		0.88	
1997	0.50		0.88	
1998	0.50		0.88	
1999	0.50		0.88	
2000	0.50		0.88	
2001	0.50		0.88	
2002	0.50		0.88	
2003	0.50		0.88	
2004	0.50		0.88	
2005	0.50		0.88	
2006	0.50		0.88	
2007	0.50		0.88	
2008	0.50		0.88	
2009	0.50		0.88	
2010	0.50		0.88	
2011	0.50		0.88	
2012	0.50		0.88	
2013	0.50		0.88	
2014				
2015				
2016				
2017				
2018				
2019				
2020				
2021				
2022				
2023				
2024				
2025				

Parameters:		Optim cells
Juvenile Survival =		0.500
Adult Survival =		0.884
Initial Total Male Pop/10,000 =		0.054
Initial Female Pop/10,000 =		0.223

MODEL ASSUMPTIONS	
Sex Ratio (% Males) =	50%
Wounding Loss (total males) =	10%
Wounding Loss (females) =	10%
Wounding Loss (juveniles) =	10%

Classification Counts										Harvest		
Year	Juvenile/Female Ratio			Total Male/Female Ratio			Juv	Males	Females	Total Harvest	Segment Harvest Rate (% of	
	Derived Est	Field Est	Field SE	Derived Est	Field Est w/o bull adj	Field SE					Total Males	Females
1993		39.72	3.62	24.18	23.40	2.61	16	310	183	509	38.7	8.3
1994		57.19	5.69	22.46	20.14	2.95	4	208	93	305	32.7	4.7
1995		69.61	4.66	23.37	23.39	2.31	10	217	102	329	33.4	5.2
1996		80.39	5.93	27.29	35.59	3.42	0	185	54	239	26.2	2.8
1997		66.32	5.33	29.43	28.28	3.05	11	248	47	306	29.4	2.3
1998		55.41	3.98	30.37	25.87	2.44	0	229	42	271	26.6	2.0
1999		60.32	6.19	29.71	37.30	4.51	4	243	96	343	28.7	4.5
2000		54.40	4.10	24.18	30.20	2.80	13	349	75	437	41.6	3.6
2001		66.42	6.42	27.46	26.12	3.51	9	167	95	271	23.6	4.6
2002		55.89	5.76	29.26	33.84	4.15	2	218	62	282	27.1	3.0
2003		75.08	6.28	30.73	27.03	3.21	9	181	43	233	22.7	2.1
2004		88.76	6.33	32.63	31.58	3.15	2	243	70	315	26.4	3.3
2005		72.82	6.62	37.78	35.19	4.07	4	227	91	322	21.4	4.0
2006		45.11	4.05	38.67	34.59	3.42	2	261	82	345	22.9	3.5
2007		67.94	5.79	37.33	32.35	3.55	7	226	103	336	21.9	4.5
2008		49.54	3.69	37.81	38.86	3.15	2	233	36	271	21.6	1.6
2009		45.88	3.46	34.95	34.95	2.91	3	248	31	282	24.2	1.4
2010		55.04	4.23	32.98	35.08	3.16	0	222	36	258	23.5	1.6
2011		49.26	4.26	33.33	37.93	3.59	2	216	66	284	23.0	3.0
2012		42.15	3.45	34.09	30.42	2.81	5	169	22	196	18.6	1.0
2013		48.29	3.80	33.45	36.22	3.15	8	171	21	200	19.4	1.0
2014												
2015												
2016												
2017												
2018												
2019												
2020												
2021												
2022												
2023												
2024												
2025												

FIGURES



Comments:

END

Mule Deer - North Natrona
Hunt Area 34
Casper Region
Revised 4/88

